STEVENSON

THE PROJECT METHOD OF TEACHING.

# THE PROJECT METHOD OF TEACHING

BY

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I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY SUPERVISION BY John Alford Stevenson

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BE ACCEPTED AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE DEGREE OF Doctor of Philosophy in Education

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# PREFACE

This investigation was begun in the fall of 1917, under the direction of Professor W. W. Charters.

A survey of the literature dealing particularly with agricultural education, the teaching of home economics and of the trades and industries and more recently the administration of the Smith-Hughes Act was sufficient to show that the project method of teaching has a wide use and also lacked uniformity.

The author undertook an investigation of the project method of teaching. It is the purpose of this volume to present an account of this investigation.

For assistance in this research I am indebted to Professor B. H. Bode of the Department of Philosophy of the University of Illinois; to Professor G. M. Whipple and Professor W. W. Charters of the Department of Education of the University of Illinois; to R. W. Stimson, Agent of the Massachusetts Board of Education, C. W. Stone, of Iowa Teachers College, W. H. Kilpatrick, of Columbia University, W. H. French, of Michigan Agricultural College, and J. F. Hosic of Chicago Normal College, who have prepared formal definitions for me; and to many others who are not specifically mentioned.

Most of all I am indebted to Professor W. W. Charters, who suggested the problem and who has aided and inspired me to carry it to completion. If it is a contribution, the greater

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amount of credit is due him, while, I, alone am responsible for its shortcomings.

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# THE PROJECT METHOD OF TEACHING

## CHAPTER I

### INTRODUCTION: GENERAL STATEMENT OF PROBLEM AND METHOD OF INVESTIGATION

A survey of the literature dealing particularly with agricultural education, the teaching of home economics and of the trades and industries and more recently with the administration of the Smith-Hughes Act is sufficient to show that the term, project, has a wide use. Nor has it been confined to the subjects cited, although it appears more frequently there than elsewhere.

Along with its use in all these fields has appeared a considerable and somewhat critical discussion of the meaning and implications of the term which has displayed a disconcerting variety of opinion. There are in existence sixteen definitions discussed by thirteen writers and none of the definitions is accepted by more than two of these. Of the definitions the following are typical:

"A project is characterized in the words of Professor C. R. Mann as follows: '(1) A desire to understand the meaning and use of some fact, phenomenon, or experience. This leads to questions and problems. (2) A conviction that it is worth while and possible to secure an understanding of the thing in question.

This causes one to work with an impelling interest. (3) The gathering from experience, books and experiments of the needed information, and the application of this information to answer the question in hand.'[1]

Charles R. Allen gives the following definition and description of the project:

"In the simplest and most general sense in which the term can be used, a project is a problem involving the discharge of a responsibility on the part of a given individual or group of individuals. It requires an intelligent application of knowledge or an exercise of skill, or both, in order that something may be accomplished. Telling a boy to oil a bearing would constitute a project in its simplest sense, in that that particular boy would be made responsible for the oiling of that particular bearing.

"In the educational sense, as described and discussed here, the term project has a more specific meaning. It implies that, in connection with the discharge of that responsibility, problems must be solved, the solution of which involves an educational experience, and that there is a problem in some major subject of instruction, the solution of which requires the student to acquire and apply fragments of minor subjects."[2]

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1. Woodhull, John F. The Aims and Methods of Science Teaching. General Science Quarterly, Vol. 2, p. 249, Nov. 1917. (C.R. Mann in answer to the writer's request for the definition of project sent a reprint of Woodhull's article.)

2. Allen, Charles R. The Project Method and the Combination of the Project Method with the Phase System. Section 10, Printed in Bulletin No. 75 and issued by the Board of Education, Massachusetts, 1916, p. 46.

Again, J. A. Drushel proposes this definition: "A project is a concrete problem outlined sufficiently fully and clearly to enable the student, for whom it is designed, to carry it out."[1]

J. A. Randall defines a school project as "a problem the solution of which results in the production of some object or knowledge of such value to the worker as to make the labor involved seem to him worth while."[2]

A careful reading of these definitions will show that, while Randall and Mann include in their concept of project the conviction of the individual that the project is valuable and worth while for him to carry out neither Drushel nor Allen indicate that this element is essential. All four writers agree that the project involves a problematic situation. Randall and Allen agree that the carrying of the act to completion is essential, while the others are satisfied to leave it on a purely theoretical plane. Randall says, "a problem the solution of which results in the production of some object or knowledge" and Allen, "a project is a problem involving the discharge of a responsibility ........ it requires an intelligent application of knowledge or the exercise of skill or both, in order that something may be accomplished." While Drushel states, "the project is outlined sufficiently fully and clearly to enable the student, for whom it is designed, to carry it out and Mann does not mention the carrying of the act to completion.

1. Drushel, J. A Definition sent to writer by Superintendent John W. Withers, St. Louis, March 23, 1918.

2. Randall, J. A. Project Teaching, N. E. A., 1915, p. 1010.

This foregoing lack of uniformity, which is typical of the literature, has been appreciated by the writers on the project method. Among others, H. P. Barrows, two years ago, pointed out the fact that "In many sections where teachers talk of projects there seems to be a lack of understanding of the plan and a lack of unity in the definition of the term. According to some teachers any effort toward giving their work a practical turn is termed a project. Others have used the word in lieu of 'practicum,' so that simple laboratory exercises are spoken of as projects." [1]

This indefinite use of the term, project, together with the diverse attempts to define or enumerate its essential characteristics and the well-known tendency of educational writers to invent unnecessary terms may properly give rise to the question as to whether the project really stands for the introduction of a new concept. A critic objecting to the introduction of new terms might very pertinently ask whether or not the different meanings of the concept might not be mere forms of other concepts now in use which could be adequately taken care of by them.

## The Problem

The solution to the problem just stated will be undertaken in the thesis. There are many incidental problems which will demand solution but the thesis will be devoted mainly to the investigation and solution of the following general divisions of the problem;

1. The determination of certain elements in a type of teaching situation which constitute the project. These will be

1. Barrows, H. P. Home Projects in Secondary Courses in Agriculture, U.S. Department of Agriculture, States Relations Service, Bulletin No. 346, p. 4, Feb. 21, 1916.

treated as four pairs of contrasted aims which will be used as standards for the discussion of the second, third and fourth investigations which follow.

2. An examination of concepts now in use and more or less closely related to the project for the purpose of estimating their availability for describing the teaching situation indicated in the first investigation.

3. A statement and explanation of the term, project, as defended in this thesis.

4. A critical examination of all extant definitions of the term.

5. A consideration of the significance of the project in relation to problem, motive, reasoning, drill, ideals and the curriculum.

6. An examination of the ideas contained in the term but under different names in the fields of law, medicine, engineering and coöperative education.

Standards of Judgment

In order to determine the elements in a type of teaching situation which constitute a project, it is, of course, necessary to set up certain standards of judgment. These have to do, on the one hand, with learning and use of subject matter and on the other hand with certain elements which will later be shown to be implied in the term project. These standards will be treated as four pairs of contrasted aims or types of learning.

(1) Reasoning and the memory of information.

(2) Conduct and information for its own sake.

(3) Natural setting for learning and artificial setting

for learning.

(4) The priority of the problem or of principles.

(1) Reasoning and the memory of information

Two widely different methods of learning have been and are still used in educational practice. The one measures its success by the ability which the child has to appropriate the material outlined by the author and give it back when called for during the recitation upon demand by the teacher. This method may be termed the acquisition of information by memory. The material in the lessons consists largely of dogmatic statements, and the mental activity demanded of the pupil is reduced largely to reproductive memory. The mental act demanded of pupils in such exercises is not reasoning but the mastery of statements outlined and organized by the author. This is clearly shown by the survey of textbooks used by children in the grades and in the high school, from one of which the following illustration is taken:

"Surface and Industry. Paraguay is a rich but undeveloped country largely occupied by Indian negro races. The surface is made up of plains and low mountains covered by forests. The plains are chiefly devoted to grazing and the production of Paraguay tea, or mate.

"Trade. Paraguay tea is cheaper than Asiatic tea and its use in South America is constantly increasing. Lumber is the principal forest product, and is sent to the Argentine Republic and Uruguay, both of which lack timber. These products, together with hides and tobacco, are the chief exports. The leading imports are textiles, provisions, hardward, and drugs.

"Asuncion, the capitol, from its position on the Paraguay

River, is the most flourishing town and commercial port.

<u>Questions and Exercises</u>

"(1) What is the chief article of trade between Paraguay and the neighboring countries?

(2) What does Paraguay import from the Argentine Republic?

(3) Give the chief advantages of the location of Asuncion."[1]

The activity which the child uses to answer these questions is largely confined to memory. The answers to questions (1) and (3) are found in the descriptive paragraph; the answer to question(2) is found in the preceding paragraph describing the Argentine Republic and not quoted here.

The recognition of the inadequacy of memorizing information is not recent, for seventy years ago Horace Mann in his Annual Report on Education for 1845 pointed out what earlier writers had noticed, viz., that verbal memory received too much attention. "The teacher may appear to do a vast deal more by stimulating the verbal memory of the child, and by giving him the show instead of the substance of knowledge, than if he should strive to reanimate the apparently dead powers of acquisition and of thought. Yet the latter should be done, at whatever seeming delay: and the faithful teacher will do it irrespective of the consequences to his own reputation."[2] And again he asserts that "a habit, too, is ........ formed of reciting, without thinking. At length the most glib

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1. Dodge, R. E. Advanced Geography. pp. 210-211. 1914.

2. Life and Works of Horace Mann, Vol. 4, p. 81, Reports and Addresses.

recitation becomes the best; and the less the scholars are delayed by thought, the faster they can prate, as a mill clacks quicker when there is no grist in the hopper."[1]

Another statement from Mann, quoted because of its humor, illustrates an extreme case of memoriter teaching.

"It recently happened, in a school within my own knowledge, that a class of small scholars in geography, on being examined respecting the natural divisions of the earth - its continents, oceans, islands, gulfs, etc., answered all the questions with admirable precision and promptness. They were then asked, by a visitor, some general questions respecting their lesson, amongst others, whether they had ever seen the earth about which they had been reading; and they unanimously declared in good faith that they never had."[2]

As the quotations indicate, the defect of the memory exercises was noted early and the correctives which were suggested by Mann and others grew into the concepts of the rational method, thought questions, and later into the more elaborate form now known as the problem method.

The problem method as described by John Dewey and others has found its psychological justification in the functional character of thinking. The origin of thinking from Dewey's point of view is some "perplexity, confusion, or doubt", a lack of knowing what to do or how to make a desired adjustment. To give Dewey's statement, "To say that thinking occurs with reference to situations

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1. Life and Works of Horace Mann, Vol. 2, p. 69, Lectures and Reports.

2. Life and Works of Horace Mann, Vol. 2, p. 68, Lectures and Reports.

which are still going on, and incomplete, is to say that thinking occurs when things are uncertain or doubtful or problematic. Only what is finished, completed, is wholly assured. Where there is reflection there is suspense. The object of thinking is to help reach a conclusion, to project a possible termination on the basis of what is already given. Certain other facts about thinking accompany this feature. Since the situation in which thinking occurs is a doubtful one, thinking is a process of inquiry, of looking into things, of investigating."[1]

The most important advantages claimed for the problem method are that it gives a better hold on subject matter and develops a technique of reasoning. These need no elaboration.

It is claimed as part of our thesis that in the analysis of concepts now in use which may be more or less related to the project it is necessary to distinguish between these two educational tendencies of the mastery of information through mere memory and its acquisition through reasoning.

The importance of the problem in developing reason is indicated by E. N. Henderson: "The use of the problem as the form of educating the reason has been especially characteristic of education in modern time. It may be said to be the largest outcome of educational reform in the direction of method, and its advent means the conscious endeavor to give to the child not merely the fixed adjustments of recapitulatory education, but also the capacity to readjust that springs from reason and its culture. In general, the educational principle that has been put forward as

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1. Dewey, John. Democracy and Education. p. 173, 1916.

representing the issue is that learning should stir up the self-activity of the child, that the child should learn from his own experience and efforts, not from those of the teacher; in other words, that the most effective teaching is self teaching."[1]

(2) Information and Conduct

It is necessary, also, to distinguish between the completion of an act as over against reading about and learning the plan of an act. Conduct as characterized by John Dewey is "a general term for the spirit and tenor of all the overt acts that constitute the behavior of an agent. As contrasted with the term 'behavior,' the word 'conduct' is usually limited to acts that have an end consciously in view and that are preceded by more or less deliberation--in short, to such acts as have moral quality, actual or potential."[2]

The implied question which it is necessary to consider is the character of the end of education. Is it the accumulation of information or the modification of conduct?

Educational writers agree that conduct is the paramount end of education. W. C. Bagley says, "Education may be tentatively defined, then, as the process by means of which the individual acquires experiences that will function in rendering more efficient his future action."[3] Dewey asserts, "It is that reconstruction or reorganisation of experience which adds to the meaning of experience, and which increases ability to direct the

1. Henderson, E.N. Principles of Education, p. 273, 1910.

2. Dewey, John. "Conduct." Cyclopedia of Education.

3. Bagley, W.C. Educative Process. p. 22, 1905.

course of subsequent experience." E. C. Moore gives a direct answer to the question proposed at the beginning of this discussion. "Learning to use one's own mind, however, in such ways that he will go on using it to advantage as long as he lives is the one, great, supreme object of education. Now that psychology has defined itself as the study of behavior, education must follow suit by conceiving its mission as that of training the student to profitable behavior - that is, to do the things that the situations which he will meet in life call for. Our contention is that these social doings are definite responses to concrete situations, and that the learning which will fit us to make them must be the learning of definite doings, not that vague thing which is called general training."[1]

Classroom teachers and textbook writers when faced by the direct question as to the end of education agree with these statements so unanimously that no notice would need to be taken of any divergent view were it not for the fact that actual classroom procedure through questions, recitations, reviews and examinations is frequently dominated by the ideal that the mastery of information and not its applications to problems of conduct is the important end of class instruction. In fact, this conflict is so real that many of the commonly used concepts enumerated at the beginning of this section have been invented for the specific purpose of giving mastery of information rather than improvement of conduct.

It must be recognized that information does modify conduct but the modification is not automatic; it is to a very con-

1. Moore, E.C. What is Education? pp. 235-236, 1915.

siderable degree both voluntary and conscious. It requires thought to apply information to conduct and this application has such a subtle technic that instruction in the applications of information is necessary as is very clearly brought out by E.C. Moore in the following paragraph:

"Should verbal study be allowed to take the place of doing? Suppose the master workman in the shop, which is the world, should say to his apprentices: 'It is true that you have come here to learn how to use the best of these tools in the working of iron, but that is a tedious and illiberal process. It will be more profitable to you if I should tell you some of the more important facts about them, and then we will spend the remainder of the time that you are to be here in analyzing the language which I shall have been compelled to employ in describing them to you. After all, language is the most important of human concerns. Some say it is a tool just like all these others here, but I think it is so much more than that that I am convinced that if you will only take the trouble, not indeed to learn to use it - for that is the least important thing about it - but to learn all the curious facts and distinctions that subtle minds have found out about it, and to recognize them when you meet instances of them, you will be better prepared to use both it and all these other tools than any amount of working with them under my direction could make you.'"[1]

The act carried to completion guarantees that the solutions will be understood and will become the property of the individual who carries it out. Information will then be measured

1. Moore, E.C. What is Education? pp. 181-182, 1915.

by the extent to which it can be made over into the experience of the individual using it to solve his problem.

It should be noted that an act may be successfully initiated and yet may not be carried to completion. A boy studying the dynamo in physics may do one or more of three things. He may read in his textbook about dynamos, he may visit the power house or he may purchase material and build a dynamo of his own. If he builds his dynamo he has obtained the most possible from his textbook. He might have stopped after purchasing his material but even then his conduct would have been modified more than if he had stopped with a reading of the text or with a visit to the power house. To the extent that the act remains incomplete, to that extent the individual has failed to exhaust the range of possible solutions and to remake more experience; and, likewise, the less will conduct be affected. Conduct is modified by memoriter information but within very narrow limits, for the range of possible solutions is reduced. Conduct is modified more if the act is carried to completion.

A concept which includes provisions and opportunities for the carrying of the act to completion and lays particular emphasis on this feature, is worthy of consideration as a standard by which to evaluate commonly used concepts more or less related to the project.

(3) Natural Setting and Artificial Setting

The question that must be answered in determining whether the setting is artificial or natural is this: Is the problem which is demanding solution different owing to the fact that it is undertaken in school from what it would be were it to

arise in life outside the school? If the solution is carried on the same way then the problem has a "natural setting" even though it is being solved in the school.

The boy in an agricultural school who determines to test his father's seed corn as a part of the assignment of the school work is carrying on the problem in about the same setting as if he were doing it at any other time. The problems in mathematics which are solved in school no differently from what they would be were they met and solved in life outside the school, would be considered as solved in their natural setting. The study of the gasoline engine in the physics class would be considered as a problem in its natural setting, if the method used in learning the parts and the way to run the engine, were not different from the method used outside of school. The same may be said of all problems in science.

The reading of Ivanhoe in schools would, likewise, be done in its natural setting if the motives prompting the reading were not different from the motives which would cause people outside the school to read it. The obligation placed on the teacher would be to stage the natural setting. This could be done by finding out why men and women read Ivanhoe and then developing this motive for the students.

The idea must be borne in mind as the discussion of natural and artificial setting proceeds that the elementary and high schools are not training scientists, or writers of fiction, or philosophers, but people who are to live on a popular level. But if the pupils decide to become highly specialized experts, it may be that the problems which they then face will assume what in

this discussion would seem to be an abstract and artificial setting. Yet this seemingly abstract and artificial setting may be the natural setting for such problems.

The farmer in pursuing his work makes plans today, purchases his seed and at the same time possibly gives attention to the purchase of stock. The plans are made for sowing, harvesting, testing of the seed and the herd. Each day presents new problems which demand solution. They arise because there is a need present. The carrying on of his activities brings him face to face with difficulties, with situations which demand solution. The natural setting of the problems which face the farmer is in the setting in which they arise in life's situations.

When, however, the subject-matter for the school course in agriculture is arranged, it is frequently found practically impossible to teach the whole range of activities that the farmer normally uses. Hence certain abstractions are made. The course may include a course in soil analysis, animal husbandry or farm mechanics. Certain problems may be planned and carried out in each one of these subjects but since some of the problems will not or possibly may not parallel any problem in his practical life, it may be said that the setting of these problems is artificial.

The artificiality of the setting of many school problems is clearly characterized by John Dewey in the following statement: "there can be no doubt that a peculiar artificiality attaches to much of what is learned in schools. It can hardly be said that many students consciously think of the subject matter as unreal; but it assuredly does not possess for them the kind of reality which the subject matter of their vital experiences possesses.

They learn not to expect that sort of reality of it; they become habituated to treating it as having reality for the purposes of recitations, lessons, and examinations. That it should remain inert for the experiences of daily life is more or less a matter of course. The bad effects are twofold. Ordinary experience does not receive the enrichment which it should; it is not fertilized by school learning. And the attitudes which spring from getting used to and accepting half-understood and ill-digested material weaken vigor and efficiency of thought........Where schools are equipped with laboratories, shops, and gardens, where dramatizations, plays and games are freely used, opportunities exist for reproducing situations of life, and for acquiring and applying information and ideas in the carrying forward of progressive experiences."[1]

The criticism that the subject matter of the school is still largely isolated from the experiences outside the school is due largely to the fact that few provisions are made for carrying forward problems in the school in their natural setting.

Methods of teaching which lay stress, on the one hand, upon abstract subject matter, and, on the other, upon the provision for, and the acceptance of, the natural setting of problems in the school, may rightfully be taken into consideration in the evaluation of commonly used concepts related to the project.

(4) <u>The Priority of Principles or of Problems</u>

These terms indicate differences in the order in which principles and problems are presented. In the first the study of principles precedes its application to a problem; in the second case the problem is staged for the learner and the principles are introduced when needed.

1. Dewey, John. Democracy and Education, p. 190, 1916.

The method is commented upon by G. R. Twiss: "As finding the place of a new fact or phenomenon in the general system is always the final step for the scientist in the treatment of a problem, so it should be for the student in the science class. Accordingly the logical position of a new fact should not be given by the teacher at the start, as so often it is, but should be found by the class after they have studied it."[1] And again, "This fundamental principle of science teaching - withhold theories until they are needed to explain the facts, and allow them to be used only as working hypotheses until the accumulated evidence forces conviction - is flagrantly violated in some of the most widely used texts in both physics and chemistry. In one physics text the wave theory of light comes almost at the beginning of the subject, and the molecular theory is introduced before the phenomena of heat are taken up. In several of the chemistries the authors take the shortest possible cut to the atomic theory. The result is muddy and vague talk by the pupils about what molecules and ether do, when plain statements of fact are required. It leads them inevitably toward a dogmatic, deductive attitude; and it fails to train them in distinguishing between fact and inference - an ability that is absolutely essential to any clear and scientific thinking."[2]

The principles that are developed by the learner in situations in which he has had need for them will function in the real situations outside the classroom. If the definitions are given first and then illustrated there is still left a doubt in

1. Twiss, G. R. Science Teaching, pp. 77-78, 1917.

2. Twiss, G. R. Science Teaching, p. 309, 1917.

the pupil's mind whether the principles can be used by him in the solution of his problem. As Twiss says, "Real knowledge of a law or principle - that is, facility or skill in using it - can be gained only by practice in dealing with problematic situations in which it is involved."[1]

The advantages claimed for the priority of the problem as over against the priority of principles are the following:

(1) The principles will be better understood when they are developed as the learner has need for them.

(2) The principles learned in this way are learned in the same order that they were learned by the race. The formulation of the principles is the capstone of the observations. It does not come first.

(3). There is more interest attached to the formulation of the principles.

The disadvantage claimed is that fewer principles may be given and a systematic outlook might be difficult to obtain. This question will be answered later when the implications of the project method are considered.

## The Problem Restated

Four pairs of standards have been mentioned: information acquired by memory and information acquired by reasoning, information for its own sake and information for use in modifying conduct, learning in an artificial setting and learning in a natural setting, and the study of principles before the problems in which they are useful as against the setting of problems with the introduction of principles as needed in their solution.

1. Twiss, G. R. Science Teaching, p. 291, 1917.

It is evident that there might be an important type of teaching situation in which the student would attack a problem in its natural setting, would obtain information by reasoning out his solution, would use this information in actually modifying his conduct and would learn his facts and principles as the solution of his problem demanded. If so, there is a demand for a name for such a teaching situation provided no concept now in use denotes these elements and provided the situation is of sufficient educational importance to warrant the invention of a new concept.

The second provision will be considered first; the first provision requires for its determination an analysis of the commonly used concepts mentioned on page 20 and referred to frequently throughout the thesis.

That such teaching situations are numerous is clearly shown by their constant recurrence in several fields of instruction. Two fields may be mentioned here and examples will be multiplied throughout the later discussions. The situation in agriculture is stated by R. W. Stimson. "In the ordinary routine of the farm it may be that the boy is required to tend the poultry. During at least one year he should be given control of at least one pen of poultry, and facilities for feeding a balanced ration and trap nesting individual birds for comparison of productivity in laying."[1]

In household science a student is required to assume responsibility for the purchase and preparation of the meals at home for a longer or shorter period with the understanding that

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1. Stimson, R. W. The Massachusetts Home-Project Plan of Vocational Agricultural Education. U. S. Bureau of Education, Whole Number 579, p. 15, 1914.

they be well balanced.

These two problems are types of situations not at all uncommon in the agricultural and household science courses which involve the standards of reasoning and information acquired as it is needed for use in carrying on a practical line of action in its natural setting.

An Examination of Commonly Used Concepts

The introductory statements show the diversity of use that is now being made of the term project and the lack of uniformity in the definitions to be such that for purposes of exactness the question demands that some sort of stable definition be invented.

But before doing so , the question as to whether the contributions the term makes could be taken care of by other concepts now in use must be considered. In order to answer this question it is necessary that the concepts, which collectively include some of the most important phases of the project, be critically analyzed into their elements and their function determined in order to compare them with the concepts for which the word project may be made to stand.

The most reliable source in which to find the concepts in common and accepted use is naturally in contemporary elementary and high school textbooks. A careful examination of forty-two books was made including texts in geography, language, science, reading, algebra, geometry and Latin. In these texts the concepts of questions, originals, examples, problems, exercises, tests, drills, reviews, illustrations, applications, demonstrations, topics, and practicums are found with sufficient frequency to warrant the statement that they include the concepts now in common

use.

These concepts will be examined critically to see if any one is sufficiently inclusive and exclusive in its scope to provide for the situations cited from household science and agriculture. If all of the four desirable standards are not included or if other than the four standards are included, it will be desirable to propose a new concept.

By way of introduction the topical method of organization will be presented.

"Since the Appalachian Mountains extend across New England, most of its surface is either hilly or mountainous. Near the coast the hills are low, but the land gradually rises toward the interior until it becomes a low plateau. This plateau is crossed by river valleys that cut into it in every direction. The valleys are usually several hundred feet deep with steep sides, so that the surface there is very irregular."

<u>Small Problems (Detailed Questions)</u>

"(1) What mountains are in New England?

(2) What is the character of the surface?

(3) Why?

(4) What is the surface like near the Coast?

(5) What is it like near the interior?

(6) What is the character of the surface of the plateau?

(7) Why?

(8) What is the character of the valleys?

<u>Large Problems (Topical Questions)</u>

"(1) What are the surface characteristics of New England?

(2) Why?

"In this paragraph are gathered together certain facts or solutions of problems which are presumably accepted as important. This means that they are useful or will be useful at some time in the future in solving problems. These facts are taught in a systematic order."[1]

## Memory Questions

The memory question is closely tied up with the topical arrangement of subject matter, which accounts for the topical arrangement ~~being given~~ above and discussed later in the treatment of the concept topic, and possibly was brought into use first to insure the mastery of the subject matter as presented. The mastery of the subject matter depends upon the ability of the pupils to memorize and be able to give back the facts which had been presented.

The question is one of the oldest devices used to develop some degree of reasoning on the part of the pupils. The lessons are assigned and the question is used not only to determine what the pupil knows, how much of the previous lesson he has understood, but ~~gives~~ the teacher a cue as to the next step in the lesson to be undertaken. The questions may stimulate the pupils to face new issues, to solve problems and again the questions may degenerate into a very formal exercise in which the teacher asks questions that can be answered by memorizing the ready-made solution of the text. At least the teacher, when directing a series of questions, dominates the more or less formal recitation with the constant danger that the outline of the unit of subject matter is not being

1. Charters, W. W. Systematic Topics, Multiproblems and Projects, (Paper read before Illinois State Teachers' Association, December 28, 1917.)

followed by the pupils. This means that the pupils are content to answer questions occasionally and the end of the hour finds that they have given many ready-made solutions, possibly not thoroughly understood and probably with little appreciation of the coherence or the main objectives of the lesson. The question may be a valuable device to stimulate reasoning but unless used by very skillful teachers it is likely to cause the recitation to degenerate into a memoriter exercise.

The questions enumerated on page 21 illustrate these memory questions. The facts which are necessary to answer the questions are given in the descriptive paragraph. The activity which is demanded is memory of facts. Suppose this question were proposed as a substitute for all the questions given: To what extent can the industries, occupations and locations of cities in New England be accounted for by its surface conditions? The answer to this question would demand a reconstruction of their knowledge of the surface conditions in New England. The memory of facts would not be sufficient to answer them.

The concept of memory questions would not be sufficient to take care of the four standards. It lays stress on memory of information rather than reasoning, on information rather than conduct, and on an artificial setting. The thought question has one advantage over the memory question in that it lays stress on reasoning but in other respects it, like the memory question, is inadequate to meet the teaching situation demanded above.

## The Topic

The topic concept illustrated on pages 21 and 22 may emphasize both the memory of information as such and reasoning, it

emphasizes information as an end in itself and information which modifies conduct. The artificial setting is stressed more than the natural setting. The topics are often selected dogmatically without particular reference as to whether they fit into the learners' problems. Since the principles are often stated in the topic before the need for principles arises, it is safe to assume that priority of principles is emphasized rather than priority of problem. The topic concept, on the one hand, includes more than the concept which we propose and, on the other, does not include priority of problem and the natural situations for problems. Hence the topic as used and understood in practice will not take care of the four elements which have been proposed and which are necessary for the solution of such situations as were cited from agriculture and household science. To make the topic do this, it would be necessary to enlarge the concept and redefine it.

<u>The Problem</u>, <u>Example</u>, <u>Originals and Exercises</u>

The concept <u>problem</u> is in current practice used very loosely. The <u>terms</u>, <u>problems</u>, <u>examples</u>, <u>originals</u>, and <u>exercises</u> are often used interchangeably in mathematics with little attention given to exact distinctions. In geometry, according to D. E. Smith, "the problem is distinguished from the theorem as being a proposition requiring some construction to be effected, while the theorem required some assertion to be proved. In algebra and arithmetic certain writers have used the word 'example' to cover all problems to be solved, and some have used 'problem' to refer only to concrete exerises."[1] The term example is often used in mathematics for a sample problem or solution to illustrate a certain mathemat-

1. Smith, D. E. Problem in Mathematics, Cyclopedia of Education.

ical process. In general, however, the example is an exercise which is set forth for the pupil to drill upon and to test his mathematical skill. The usual distinction between it and the problem is that the former is a symbolic or abstract statement of the facts, the latter is concrete. The distinction made by Henry Suzzallo is cited, "The 'example' is usually completely expressed in mathematical symbols, and the 'problem' is commonly stated in words........ In the case of the example, the mathematical sign tells the child what to do, whether to add, subtract, multiply, or divide; the 'example' being a kind of pre-reasoned problem, the pupil has only to manipulate according to the sign, his whole attention throughout being focused on the formal calculation. In the second case, the child has two distinct functions: he must, from the description of the situation presented, decide through the process of reasoning what he is to do (add, subtract, divide, or multiply), and having rendered his judgment, he must proceed through the formal calculation."[1]

The term original is frequently used in geometry. It is similar to a new theorem; the only difference is that in the general usage, the theorem has the construction made and the proof partially or completely stated, while the original leaves the proof to the learner. In this sense it is no different from the problem as defined by D. E. Smith on page 24.

The term exercise is used in a very broad and indefinite sense. A consideration of its use in the textbooks reveals the fact that it frequently covered what has been defined by problems, theorems, examples and originals.

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1. Suzzallo, Henry. Example. Cyclopedia of Education.

Before giving further consideration to the analysis of these terms, the definition of the term, problem, in its general use is given as stated by John Dewey, "Every conscious situation involving reflection presents a distinction between certain given conditions and something to be done with them; the possibility of a change. This contrast and connection of the given and the possible confers a certain problematic, uncertain aspect,upon those situations that evoke thought. There is an element, which may be slight or which may be intense, of perplexity, of difficulty, of confusion. The need of clearing up confusion, of straightening out an ambiguity, of overcoming an obstacle, of covering the gap between things as they are and as they may be when transformed, is, in germ, a problem."[1]

In relation to the eight standards, the problem may lay stress on either the memory of information or reasoning, it usually emphasizes the intellectual phase of the solution rather than its carrying over to modify conduct, it takes into account the natural setting but may and often does accept an artificial setting, and as interpreted by the leading advocates of the problem method it favors the priority of problem over the statement of principles. It does not, therefore, exclusively include all the standards which are necessary to take care of the type of situations as illustrated from agriculture and household science. It lacks most in that the solution is not necessarily carried over into action, but rather emphasizes intellectual activity. Unless the concept of problem as ordinarily used is modified,it will not take care of the items which our proposed concept embraces.

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1. Dewey, John. Problem, Cyclopedia of Education.

The original and example have the shortcomings of the problem and in addition they lay emphasis on the priority of principles. The exercise, an inclusive term for the three concepts, likewise does not include the necessary standards.

Drills, Tests and Reviews

The concepts drills, tests and reviews will be considered next. Drill is defined by E. N. Henderson as "the systematic endeavor to fix firmly habits or associations between stimuli and responses. These associations may connect sense stimuli with ideas or with movements, or ideas with other ideas or with movements."[1] Drills may mean the fixing of a physical or a mental habit. To pass in the school line properly is a physical habit, to be able to givethe product of 8 x 8 quickly is a mental habit. The drill is important, since much of the work in the elementary school is drill. One writer states that three fifths of the time in the elementary school is absorbed in drill.

Tests are used to measure the efficiency of the work done in schools. E. E. White wrote that "the test has for its end the disclosing of the results of instruction, drill and study, the disclosing of the pupil's attainments."[2]

According to Henry Suzzallo, "A classroom exercise devised to survey the facts and principles previously learned by observation, discussion, reading, etc., is a review. It is literally a reviewing of already acquired knowledge in a detailed and completely connected way, so as to relate the items and emphasize the more important of them."[3]

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1. Henderson, E. N. Drill, Cyclopedia of Education.
2. White, E. E. Art of Teaching, p. 53, 1901.
3. Suzzallo, Henry, Review, Cyclopedia of Education.

These concepts do involve memory of information, and the test may involve reasoning. They may also modify conduct but in a limited way because the act is not carried to completion. But these concepts will not lay emphasis on natural setting for solution or on priority of problem over the statement of principles. Since none of the concepts includes the necessary elements for the situations previously stated, without changing the meaning of these concepts as now understood, it will be seen that they can not be used for the proposed concept.

Illustrations, Demonstrations, Experiments and Practicums

There is another group of concepts which may be properly discussed together, for the variation in their meaning is not very great. These concepts are illustrations, applications, demonstrations, experiments and practicums.

Application is the fifth step that is laid down by the Herbartian theory. In the acquisition of knowledge from the printed page the question of a complete mastery may be raised. The application of this knowledge to actual situations will guarantee a more complete mastery. The value of application is pointed out by W. C. Bagley, "It is safe to say, however, that the application in some form should always follow the generalization. The pupil should learn from the start that knowledge as it exists in the form of laws, principles, rules, or definitions is utterly valueless, unless, directly or indirectly, it can be carried over into the field of practice."[1] In general, application has been considered as the step in applying principles previously learned. Henry Suzzallo offers another usage of application, "In modern

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1. Bagley, W. C. The Educative Process, p. 303, 1905.

pedagogical practice, the principle has two modes of expressing itself: (1) In requiring that the original acquisition of knowledge and values be the product of action, as in any process of 'learning by doing.' This is the characteristic mode that the principle takes in the 'active learning' of the kindergarten and the more modern type of primary school. It is also noted especially in the teaching of manual training, laboratory science, drawing, singing, and similar subjects affording a large opportunity for action."[1]

Demonstration "in its literal and etymological sense, means showing something to be thus and so, pointing to an object that exists or an event that occurs so as to induce perception of it........ In its stricter sense, demonstration means conclusions that follow with rigid necessity from premises which are themselves regarded as necessary truths, or which are derived from such self-evident truths."[2] Demonstration is a method by which the teacher or instructor conducts the experiment before the class. It is used to carry out a lesson, which for any reason, is not practicable to be carried out as a class exercise. The teaching in the natural sciences is sometimes done by demonstrations by the teacher, but more often the teaching is carried on by having the students conduct individual experiments.

Teaching by experiments is "part of the general movement for learning through direct observation." The instruction by experiment is sometimes called the method of "rediscovery." Henry Suzzallo considers such a use of the term loose, "inasmuch as there is little or no inventivensss on the part of the student in

1. Suzzallo, Henry. Application, Cyclopedia of Education.
2. Dewey, John. Demonstration, Cyclopedia of Education.

the devising of apparatus or the arranging of conditions. These are all prearranged by the instructor so as to make a conclusion fairly obvious. Teaching through experimentation is a highly rational representation of scientific facts rather than a rediscovery."[1]

The experiment has likewise made a very valuable contribution to the methods of teaching - in that it combines the realistic presentation of material with observation and verification of principles by the pupil. The experiment gives opportunity for action, for providing the pupil with experiences as well as verbal information. It, as a concept, fails in proportion as the principles are first stated dogmatically, with experiments used to explain or illustrate principles. This is too often understood to be the meaning of experiments in teaching.

The term, practicum, represents one of the latest concepts in methods of teaching. The term is used particularly in agricultural education. It usually means the application of principles learned to the carrying out of an exercise which has economic value and which is of interest to the pupil. The definition given in the Standard Dictionary is "In some colleges and universities an academic exercise consisting of practical work as in the laboratory."

The <u>concepts</u>, <u>application</u>, <u>demonstration</u>, <u>experiment</u>, and <u>practicum</u> do not make provision for the elements which our proposed concept includes and which seem worth while to include. In each of these concepts principles are given priority over natural setting. In application the principles are applied, in the demonstration the principles were shown to be true or false,

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1. Suzzallo, Henry. Experiment, Teaching by. Cyclopedia of Education.

in experiment the principles are illustrated and in the practicum principles are applied in developing something economically valuable. In no case is the interest of the pupil aroused in being placed in a situation where principles must be developed as needed. This after all seems to be an exercise sufficiently worth while educationally to be embodied in a concept.

It is evident that the foregoing commonly-used terms do not in their ordinary meaning denote exclusively a method of teaching, involving reasoning primarily for the sake of modifying conduct in its natural setting and the introduction of principles as they are needed in the carrying out of an act. If any of the foregoing concepts or terms are used, some qualifying adjective would have to be added to it with attendant complication arising from confusion of meaning.

In the next chapter, the proposal of a term to include these elements will be made with definition and discussion.

## CHAPTER II

## DEFINITION OF THE PROJECT

The discussion and analysis of the types of teaching which have been considered in Chapter I show that concepts now in use are inadequate without modification of meaning to take care of teaching situations similar to those given in agriculture and household science and since the concepts cited already have their implications well described and understood in common practice it is preferable to adopt a new concept to describe the teaching situation characterized by the four standards. This term which we propose to accept and define is the concept project.

Historically the term project has been used in business with a rather vague meaning for many years. Later it was accepted by the United States Department of Agriculture as an outlined plan for carrying on a piece of coöperative work. It was first used in vocational education by R. W. Stimson as the home project in the agricultural courses of the Massachusetts vocational schools and was in 1910 embodied for the first time in the term project as defined by Stimson, Snedden, Prosser and Allen in their report to the Massachusetts Legislature which was published in 1911. Since its use in Massachusetts in vocational education the term with many variations in meaning has been applied to many of the subjects of the course of study.

But while the term, project, has been of such recent origin as a school concept, the idea behind the term has been

used with some modification of one sort or another as will be shown in Chapter IV by law, medicine, engineering and coöperative education, for some time, and in various informal ways has been slowly developing in many of the subjects of the curriculum of the elementary school, the high school and the college.

The term is now used widely in agricultural education, household science, manual arts and is gradually being introduced into the field of general science. By the most enthusiastic advocates, it is claimed that it can be made to apply to most fields of education.

The justification for taking a term that has been in use for some time is that in general the aim of those who use it has been to take care of situations such as we have proposed in agriculture and household science. The use of the term project (with its very few definitions) seems to point to the movement for a term which will accommodate the above mentioned situations. Again, since few formal definitions have been proposed and since the limits of the project, as interpreted from the literature have not been clearly drawn, it would seem advantageous to use it as our term and avoid the necessity of proposing another one. By so doing we should avoid the confusion which might come later in the use of the term project and the new concept which we propose.

The definition of the project which is proposed for substantiation is the following:

A project is a problematic act carried to completion in its natural setting.

In this definition note that (a) it implies an act carried to completion as over against the passive absorption of information, (b)

it develops the problematic situation demanding reasoning rather than merely the memorizing of information, (c) it implies by emphasizing the problematic aspect the priority of the problem over the statement of principles, and (d) it makes provision for the natural setting of problems as over against an artificial setting. A brief discussion of these particular phases of the definition will be given.

(a) The presentation of subject matter on the staging of a situation which results in activity, in carrying out the act to completion as over against the passive acceptance of information is one of the most significant contributions of the project. For the term, act, or action, the definition of E. B. Titchener may be accepted. "In its most general meaning, an action is an organized movement; less generally, it is a movement of a locomotor organism;..... The characteristic feature of the action consciousness, as distinguished from the consciousness so far considered, is its predetermination in the sense of the idea of end. The presentation of the object arouses associative tendencies in the usual way; but only those tendencies are realized which lie in the line of suggestion, of the meaning of the idea of end.

"We translate this fact into physiology by saying that the excitatory processes underlying the idea of end set up determining tendencies; they open certain nervous channels, as it were, and close others; so that the consequent excitations find their path laid out for them."[1]

1. Titchener, E. B. A text book in Psychology. pp. 448-449. 1910.

In ordinary usage of the term, activity means the contraction and relaxation of muscles in physical activity. For educational purposes the meaning should be broadened to include the situations defined by Dewey "as a series of changes definitely adapted to accomplishing an end. Hence it is opposed to restless and random changes, as well as to mere quiescence and passive absorption. Dictated exercises, 'busy work,' etc., when not accompanied by any sense of a result to which they naturally contribute, are not activity in its genuine, or intellectual, significance; neither is undirected overflow of motor impulse."[1]

There are many different kinds of activity, intellectual, social, religious and physical. The project does not limit itself to physical activities alone but makes provision for these other acts, provided the individual takes a part in the purpose, choice, and reflection of the directed action. Thus "physical activity when not accompanied by any sense of the result" is not considered activity but intellectual activity when accompanied by a sense of result is considered an activity in an educational sense.

The importance of action is well summarized by W. B. Pillsbury: "Every once in a while one observes an individual who knows the right and approves, but does wrong. The only cure for this condition is to develop a habit of action. This can be done most effectually by making the child appreciate the advantages of action and the disadvantages of inaction. An individual left to take the natural consequences of his acts will

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1. Dewey, John. Activity, Logical Theory and Educational Implications of. Cyclopedia of Education.

soon develop a habit of doing the thing that he sees should be done, at the same time that it should be done. It is only the individuals who are protected from the consequences of inaction and indecision who continue inactive in the face of acknowledged duties. If a habit becomes established, there is no longer question whether a thing shall be done or not; the situation at once evokes a decision, and the decision evokes the act."[1]

The educator, in giving emphasis to the different standards of teaching, should be certain that emphasis is not given to passivity or that pupils are "protected from the consequences of inaction" by the methods used in school. The project includes the act and gives a maximum of emphasis to training in action.

The expression problematic act has been formulated and used in the definition of project for the distinct purpose of emphasizing not only the act but also the problematic aspect of the act.

(b) It is essential that the project be understood to include a problem otherwise, it could not be differentiated from habits and reflexes, as W. W. Charters well illustrates: "First, the project is a problem. This differentiates it from reflex and habitual acts such as digestion and respiration which are normally carried on without the intervention of consciousness, or from knitting or dishwashing when they have become habitual. Any of these may become problems, as the control of respiration to the singer, or knitting to a novice. They are problems when they require thought but when they are reflexive or habitual

1. Pillsbury, W. B. Essentials of Psychology. p. 312, 1911.

they are no longer problems."[1] Habits and reflexes such as the foregoing, since no problem is involved, nor a difficulty demanding solution is present, cannot be considered as acts in the sense which the project demands.

The project may of course include habits and reflexes, provided in addition, there is involved a problem or a situation demanding reasoning for a solution, as the following illustration of controlling the San José scale will indicate. The Bordeaux mixture may be decided upon as the most advisable remedy and the consequent purchase of lime and copper sulphate may take place habitually with a minimum of thought. The preparation of the solution and the actual spraying of the trees may be taken care of by habit but the problematic phase must be included at least when the results are watched carefully and a tentative judgment rendered as to its effectiveness with a probable decision to vary the mixture or substitute a better remedy to meet the conditions.

(c) The problem aspect of the project not only involves reasoning but contains a distinct implication of priority of the problem situation over the statement of principles. There are two methods of arriving at solutions or results as carried on in life, the one is a knowledge of principles already learned, as when the one making the solution knows the principles and then tries to apply them; and the other, which we call the problem method, when the first approach is made by the learner to a difficulty. In this latter method principles are developed as needed, while in the former most of the principles have been learned and the problem is one of application. The problem

1. Charters, W. W. The Project in Home Economics Teaching. _The Journal of Home Economics_. Vol. 10, p. 114, March 1918.

method carries with it the implication that principles will be developed as needed and not learned first. Hence the project, which makes specific provision for the problem, lays emphasis on its priority over the statement of principles.

The method of arriving at solution, where the principles have been learned first and the problem is largely one of applying them, can with greater accuracy be called the original, laboratory exercise, application or practicum. For instance, in connection with the study of vegetables, it may be proposed that the students each prepare a garden and grow the vegetables. If this were done merely to illustrate or give a practical laboratory exercise upon the principles learned in school it could be considered as an application or laboratory exercise. The practicum would differ only in the insistence that there should be some commercial value. The project would indicate and set the stage of the task, but the principles would be developed by the pupils as they needed them in the prosecution of their work.

(d) The implication of the meaning of the natural setting has been discussed in Chapter I, and it is unnecessary here to go into detail other than to state that the project provides for the natural setting of situations, which means that the solutions undertaken in school are no different because they are school problems than they would be were they to come up in life outside the school.

The statement of W. W. Charters shows the difficulty in describing or defining natural setting. "The term natural setting is full of difficulties of definition when carried into the interior of any body of subject matter, but for our purposes

[in home economics] it is relatively simple as an illustration will make clear. The problem of canning may be carried into the field of practice by the canning of a small amount of fruit in small utensils and the student may learn the practice of canning or perhaps it is better to say obtain a simple illustration of the practice. But this is not the natural setting of the action. The amount of the fruit is unusual. If the student were canning at home she would have to can a peck or a bushel and would have to use several jars. The process is also unnaturally simple. If she were canning a bushel of fruit she would probably have simultaneously to watch a fire, get many jars ready, find proper places to set them or attend to one portion while another is cooking."[1]

A few additional illustrations of problems in natural setting may help clarify its significance.

The determination of the profitable cows in the father's dairy herd may be undertaken by the boy, utilizing the scientific method taught in the school. He will be brought face to face with many difficulties in keeping a daily record, in perfecting his methods, and evolving his principles as he needs them in making the determination. While this may be a part of the school program, yet the setting is practically identical with that of the dairyman who makes this test.

The writer, in teaching the subject of machines to a mixed class, brought to the school yard for purposes of illustration a windlass, block pulleys, and a large board which could be used

1. Charters, W. W. The Project in Home Economics Teaching. The Journal of Home Economics. Vol. 10, p. 116, March 1918.

as an inclined plane. The members of the class were given problems in the manipulation of the pulleys and windlass to show the advantages of the machines. The whole lesson was interesting and probably was more spectacular than a demonstration given in the laboratory with model pulleys and windlass. But while this lesson may have been effective, it could not be classed as a project, since the setting was artificial. One of the members of the class, however, had already been busy with the task of lifting baled hay into the barn loft with the aid of a single fixed pulley, which gave him the advantage of direction but nothing else. For him this became a project, for he took up the problem which faced him, finding his principles and making the application, with the result that he installed a pulley in the loft with the ratio of 1:6. Later, he reported to the class the entire development of this project, laying particular emphasis on the ease of the task compared with the former method. For the boy this was a project, since the problem was carried to completion in its natural setting.

There may be some question as to whether a proposed project begun in its natural setting although not completed or even not completed in its natural setting can be considered as meeting the requirements set forth in the definition of carrying the act to completion in its natural setting. This question seems significant to propose, although the literature does not indicate it. The task begun in its natural situation but not completed in its natural situation is well shown in the following: A boy may have the problem of finding good seed corn for his father. He may become very much interested at the time in the method of

testing seed corn because of the proposed purchase. If the boy takes some of the seed corn to the laboratory, tests it as a mere laboratory exercise and stops there,he has the exercise arising in its natural setting but not carried to completion in its natural setting. This may be called an uncompleted project. If the boy had tested the seed sufficiently to be able to give his father scientific advice, it would have constituted a project. Again, the growing of a few rows of potatoes may be the project accepted and the method of planting potatoes, the purchase of the seed and the actual planting may go on but if the task is given up for any reason, as when the potato bugs attack the plants, then the project is not completed and may be called an incomplete project. The following year the boy may accept as his problem the method of destroying the potato bug pest and may find out how to do it, yet this will be termed a problem because it was not handled in connection with the actual situation of controlling the pest.

The act carried to completion in its natural setting indicates that the learner has used material and data in a way which is no different were it done outside of school activities and has thereby received a greater functional value than if the act were not completed or completed in an artificial setting.

The situations which were proposed in connection with the study of household science and agriculture will be considered in the light of the definition given for the project, to see if situations of this nature can be properly cared for by the project.

The boy who controlled at least one pen of poultry, with facilities for feeding a balanced ration and trap nesting individual birds for comparison of productivity in laying would

be brought into a situation which demands reasoning. The memory of information would not be sufficient to carry on this problem for the conditions as they change daily demand reasoning. The results of his investigation and the principles which would be evolved as needed would result in the completion of the act in its natural setting. If the boy had become interested in the project, had started it, but after a few days or weeks had stopped, no results of any consequence would have resulted and it would have illustrated a situation arising in its natural setting but not carried to completion.

In order to provide a concept which will care for all such situations where emphasis must be given to reasoning, to carrying the act to completion, (the modification of conduct), to the priority of the problem and to the natural setting for problems, the project, as defined by us is proposed.

## Criticism of Current Definitions

Situations such as the foregoing have been recognized for a long time by educators as a type of educational problem which is worthy of solution, even though it has seemed difficult to devise a teaching unit which would handle such a situation. The recognition of the need for such a concept, has led to discussion of the project with concurrent definitions which vary more or less in inclusiveness yet which indicate a search for a concept such as proposed. The literature has been thoroughly canvassed to find out the extent and significance of the use of the concept project, the variability in the definitions and to ascertain what teaching situations are back of the proposed definitions. The published definitions or characterizations of the project,

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[illegible]

[illegible]

[illegible]

[illegible]

together with supplementary definitions received from writers at the request of the author will be stated, with criticisms and a summary.

The definitions will be classified under the divisions proposed in (1) general educational theory, (2) agriculture, (3) general science, (4) industrial education, and (5) English. The order of presentation will be to give the definitions for each group followed by a discussion and comparison of each definition with the four standards of teaching which have been proposed heretofore.

(1) Definitions proposed by men interested in general educational theory:

"The project is considered to be an act carried to completion in its natural setting and involving the solution of a relatively complex problem."[1]

The definition by Charters gives specific emphasis to the problematic phase of the project which distinguishes it from habits and reflexes. They are considered problems when they involve thinking. In another paper Charters in discussing the topical method calls attention to the weakness of this method of confining most of the mental activity largely to memory. Again in this same paper he states that "the prime essentials of the project are, that it must involve the solution of a problem and that it must culminate in action."[2] The act carried to comple-

1. Charters, W. W. The Project in Home Economics Teaching. The Journal of Home Economics. Vol. 10, p. 114, March 1918.

2. Charters, W. W. Systematic Topics, Multi-Problems and Projects. Paper read before Illinois State Teachers' Association, Dec. 28, 1917.

[illegible]

tion is a recognition by Charters that conduct is favored over information as an end in itself. The priority of the problem over statement of principles is indicated by the author in the paper Systematic Topics, Multi-problems and Projects. "In the topical organization principles are learned first, while in the project, the problems are proposed which demand in the solution the development of principles by the learner as needed."[1] The natural situation for problems is one of the main elements in the definition. In citing other advantages for the project the writer indicates that "it gives training in locating and solving problems, it gives training in the technique of action and it teaches subject matter in connection with life situations."

The definition proposed by Charters designates the act as complex. This statement seems to limit its scope. There may be, it seems, certain activities which can very well be classed under the rubric of project and yet be relatively simple. For example, the girl who decides to make a special loaf of bread, develops new principles as needed and carrying this simple act to completion, is carrying out a solution which is a project. If such situations are not included in the concept project, another term would be demanded, which would surely lead to confusion, particularly in the distinction of simple acts and complex acts.

Thus, the definition suggested by Charters includes the four standards of teaching but seemsto limit its scope in including only relatively complex problems.

The following definition is proposed by W. H.

1. Charters, W. W. Systematic Topics, Multi-Problems and Projects. Paper read before Illinois State Teachers' Association, Dec. 28, 1917.

Kilpatrick: "The term 'project' contemplates a complete act (or experience) which the agent projects, purposes, and within limits sees through to completion."[1] Since the learner projects and purposes the solution it seems evident that more emphasis is placed on reasoning than on reproductive memory. In projecting a solution, conditions will vary, new situations will arise, which demand some degree of reasoning. The complete act is contemplated but apparently not enough emphasis is laid on carrying the act to completion, for the latter part of the definition indicates that there are limitations in carrying it through. Since conduct is modified to the extent that the act is carried to completion, we seem warranted in making the statement that the modification of conduct is not a very significant element in this definition. There seems to be a slight inconsistency in the definition, for if the project contemplates a complete act, it would seem that the realization of a complete act would be necessary rather than an approximation to one, as indicated in the phrase "within limits sees through to completion." The priority of the problem over the statement of principles and the provision for the natural setting of the problem are not indicated. The definition by Kilpatrick includes provision for reasoning and for the completion of the act "within limits" but makes no clear provision for the natural setting of problems or the priority of the problem over the statement of principles.

In order to understand clearly the definition proposed by C. W. Stone: "A project is a Life Topic in which the processes

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1. Kilpatrick, W.H. Definition proposed in a letter to the writer, March 21, 1918.

and objects of learning are largely manual,"[1] additional quotations will be given, showing the author's meaning of the terms used. "Life Topics may be variously defined as, -

"Units of learners' experience in which both learners and teachers recognize worthy value.

"Units of learners' experience that are worthy of re-making in terms of more formal subject matter.

"Units of learners' experience out of which the more formal subject matter may be differentiated.

"Phases of life that are worthy of improvement."

"A consideration of these definitions leads one immediately to an analysis of life value, and a helpful analysis is in terms of thinking, doing, and feeling; for it is in these three lines that we do our living and have our experience. A Life Topic, then, in which thinking predominates evidently holds values that are to an extent different and distinguishable from the value of a Life Topic in which doing predominates; and a Life Topic in which feeling is the important value is also distinguishable from either of the above. The terms which seem to best fit these three types of Life Topics are Problem, Project, and Appreciation Unit. The definitions of these terms may be worded then, -

"A Problem is a Life Topic (unit of learners' experience) in which the processes and objects of learning are largely mental.

"A Project is a Life Topic in which the processes and objects of learning are largely manual.

"An Appreciation Unit is a Life Topic in which the

1. Stone, C. W. Teaching Units. Summary sent to writer March 21, 1918.

processes and objects of learning are largely emotional.

"It should not, of course, be understood that there will be no 'manual' in a Problem nor that there will be no thinking in a Project; much less would it be safe to come to the conclusion that there will be no appreciation in Problems and Projects."[1]

The definition outlined by Stone makes provision for reasoning but the wording states negatively that there may be reasoning but not positively that it must be included: "It should not, of course, be understood...........that there will be no thinking in a Project." Life Topics defined as "phases of life that are worthy of improvement and in which the learner recognizes a worthy value, indicate that the modification of conduct has been considered. Another example shows that the completed act is an element in the definition."[1] "In a community in which cotton will mature it is best studied as a Project, and the work will include the raising of the plant, picking of the fibre, simple ginning, etc."[1] The natural setting finds its implication in the writer's use of Life Topic, which gives to the project the same setting as an activity would have if taken up out of school. The priority of the problem over the statement of principles is indicated in the definition of the life topic as "Units of the learners' experience that are worthy of re-making in terms of more formal subject matter." It is quite likely that the statement of principles first would indicate what Stone means by formal subject matter.

This definition includes the four standards of teaching which have been posited as desirable in the concept project but

1. Stone, C. A. Teaching Units. Summary sent to writer, March 21, 1918.

it is limited in scope, for seemingly only acts which demand manual activities are considered projects. This would make it difficult to provide projects in civics, sociology and English.

(2) Definitions proposed by men interested in agricultural education:

The definitions or characterizations and use of projects in the field of agriculture have been extensive. The definition by Stimson, Snedden, Allen, and Prosser is as follows:

"Finally, a farming project, as the term is here used, is a thing to be done on a farm, which, in the preparation for doing it and the carrying of it out to a successful result, would involve a thoroughgoing educational process. A complete definition of a 'Project' as here used has three elements. Thus, it will be seen that a complete definition of a farming project as here used involves the three elements of (1) something to be done on a farm, (2) under specified conditions and for a specified valuable result, and (3) requiring a thoroughgoing training. The farming project may include (1) improvement projects; (2) experimental projects and (3) productive projects."[1]

This definition makes a specific place for the natural setting of problems; they are connected with the farm and its activities. It modifies conduct in laying emphasis on carrying the act to completion; "for a specified valuable result;" and reasoning is implied in the statement that it would involve "a thoroughgoing educational process." Of course, the meaning of this expression is uncertain, but since the conditions of the

1. Report of the Board of Education of Massachusetts on Agricultural Education, 1911, pp. 41-43. Also reported in, - Stimson, R. W. The Massachusetts Home Project Plan of Vocational Agricultural Education, U. S. Bureau of Education, Bulletin 579, p. 13, 1914.

projects outlined vary, reasoning as over against memory must be a necessary element.

The definition does not indicate the priority of the problem over the statement of principles but Stimson seems to indicate this in the following quotation: "The training of the boy who desires a vocational agricultural diploma includes, as we have seen, the subject study of English, history, civics, botany, chemistry, and general agricultural subjects, such as soils, tillage, and crop rotation. That this subject study does not precede but accompanies or follows the boy's project study directly and decidedly enhances its value."[1] This, of course, does not state that the priority of the problem over the statement of principles is always desirable. In another statement Stimson, however, seems to indicate that the project is looked upon as a means of illustrating and using principles already known, as well as to develop new principles and acquire new knowledge, for he states: "The movement from observed data of agricultural production to general laws and principles is followed by the reverse movement, which is embodied in the application of the laws and principles of science - embodied, that is to say, in economic agricultural enterprises conducted by the pupils on their home farms under competent school supervision."[2] Since leaving Massachusetts, Snedden has given a more complete characterization and application of this term, which is quoted at some length.

1. Stimson, R. W. The Massachusetts Home Project Plan of Vocational Agricultural Education, U. S. Bureau of Education, Bulletin 579, p. 37, 1914.

2. Stimson, R. W. The Massachusetts Home Project Plan of Vocational Agricultural Education, U. S. Bureau of Education, Bulletin 579, p. 38, 1914.

"A few years ago some of us began using the word 'project' to describe a unit of educative work in which the most prominent feature was some form of positive and concrete achievement. The baking of a loaf of bread, the making of a shirtwaist, the raising of a bushel of corn, the making of a table, the installation of an electric bell outfit - all these, when undertaken by learners, and when so handled as to result in a large acquisition of knowledge and experience, were called projects. Projects of this kind might be individual or joint (coöperative). They might be executed in an ordinary lesson period or they might claim the efforts of the learner for one or more hours per day for several weeks.

"The following were the primary characteristics of projects as thus conceived: (a) the undertaking always possessed a certain unity; (b) the learner himself clearly conceived the practical end or outcome to be attained, and it was always expected that this outcome was full of interest to him, luring him on, as to a definite goal to be won; (c) the standards of achievement were clearly objective - so much so that the learner and his fellows could, in large part, render valuable decisions as to the worth - in an amateur or in a commercial sense - of the product; and (d) the undertaking was of such a nature that the learner, in achieving his desired ends, would necessarily have to apply much of his previous knowledge and experience - perhaps heretofore not consciously held as usable in this way (e.g., art, science, mathematics, special tool skill) - and probably would have to acquire also some new knowledges and skills........ In a sense any concrete job undertaken in a

vocational school where the realization of valuable results in product constitutes an important end, might be called a 'project'; but to be an 'educational project' such a job (e.g., ..... wiring a room, growing a half acre of potatoes, etc.) must be of such a nature as to offer large opportunity, not only for the acquisition of new skill and experience in practical manipulation, but also for application of old, and learning of new, 'related knowledge' - art, science, mathematics, administration, hygiene, social science, etc."[1]

This characterization of the project makes provision for the modification of conduct, the act is carried to completion for as Snedden states "the most prominent feature was some form of positive and concrete achievement." In carrying the act to completion, valuable decisions would be made and in reaching conclusions much previous knowledge would be applied and in addition new knowledge would be developed. Thus reasoning is clearly an element to be considered, but the priority of the problem over the statement of principles is not considered to be essential by Snedden; in fact, the project as he conceives it applies principles already learned and in carrying this to completion develops new ones. The practical outcome of the projects indicates that the natural setting is always assumed.

In the Report of Agriculture in the High Schools of Michigan in 1916, W. H. French gives a definition and illustrations: "the 'home projects' may be defined as a piece of farm work selected by the student with which to illustrate some theory,

1. Snedden, David. The Project as a Teaching Unit. School and Society, Vol. 4, pp. 420-421, Sept. 16, 1916.

or to demonstrate some plan of procedure which has been presented in the course of the school instruction. For instance, a certain theory has been presented in regard to corn culture, and the boy undertakes to raise an acre or more of corn in accordance with the instruction. This would constitute a home project, or if a certain plan of raising alfalfa had been taught, the boy would elect to demonstrate the truth of the teaching by raising a plot of alfalfa; or the necessity for keeping a record of milk or butter production of dairy cows has been taught in school, and the boy undertakes to keep a record of each cow in his father's herd for the season to show whether they are profitable animals to keep on the farm."[1] In a letter to the writer, March 22, 1918, French defines the agricultural project "As something to be done in agricultural practice, or we mean a productive piece of agricultural work, either as related to the raising of crops, fruit, poultry, animal husbandry or keeping records of a dairy herd, testing for butter fact, etc."

The project as conceived by French carries the act to completion in its natural setting, which setting is connected with the farm, and thus provides for the modification of conduct and the natural setting but does not agree to the priority of the problem over the statement of principles for he considers that the project is a piece of work selected to illustrate some principles already studied or learned. Reasoning is provided for only on the basis of applying principles. The definition proposed

1. French, W. H. Report of Agriculture in the High Schools of Michigan, 1916. Also quoted in
Lane, C. H. Aims and Methods of Project Work in Secondary Agriculture. School Science and Mathematics, Vol. 17, pp. 805-806, Dec. 1917.

by French according to the standards set up, could not be classed as a project, but could very well be termed a <u>practicum</u> or an application of principles, with emphasis on the economic value of the product.

The definition and characterization of the term <u>project</u> has been discussed at some length by H. P. Barrows, C. H. Lane and F. E. Heald of the United States Department of Agriculture. This characterization is evidently the coöperative work of the three men.

"The following definition of a home project is suggested: "The term 'home project' applied to instruction in elementary and secondary agriculture includes each of the following requisites: (1) There must be a plan for work at home covering a season or a more or less extended period of time; (2) it must be a part of the instruction in agriculture of the school; (3) there must be a problem more or less new to the pupil; (4) the parents and pupil should agree with the teacher upon a plan; (5) some competent person must supervise the home work; (6) detailed records of time, method, cost, and income must be honestly kept; and (7) a written report based on the record must be submitted to the teacher. This report may be in the form of a composition or a booklet."[1,2,3,4]

1. Lane, C. H., and Heald, F. E. <u>U. S. Department of Agriculture</u>, Bulletin 281, States and Relations Service, p. 1, Aug.12, 1915.
2. Barrows, H. P. <u>U. S. Department of Agriculture</u>, Bulletin 346, States Relations Service, p. 4, Feb. 21, 1916.
3. Heald, F. E. The Project in Agricultural Education. <u>General Science Quarterly</u>, Vol. 1, p. 166, March 1917.
4. Lane, C. H. Aims and Methods of Project Work in Secondary Agriculture, <u>School Science and Mathematics</u>, Vol. 17, p. 807, Dec. 1917.

"A distinction should be drawn between a project and a simple exercise used as a practicum to illustrate some principle, or for the purpose of increasing skill in some operation of farm or shop. A project, to be worthy of the name, should involve skill in many operations and the application of a number of principles. To accomplish this it should cover a branch of farming that will extend over a comparatively long period of time. The testing of seed corn may be cited as an example of a simple laboratory exercise performed at school. The stringing of seed corn would be a suitable home practicum, the aim of which would be to acquire skill in a useful operation. The growing of an acre of corn would involve both of these operations and many others, hence it would be a worthy project."[1]

In explanation of the seven requisites of a home project, Heald in another article says:

(1) "The plan must have an aim which is in accord with the general scheme of work, in which the pupil has an interest at the outset and in which there is some problem more or less new. The person who approves the project at the outset should have some broader view of the applications and should shape the general plan accordingly.

(2) "The project should involve principles already studied or which are studied concurrently with the practice. The discoveries of others should be found out, either by observation or by reference study, and records of these should be compiled.

1. Barrows, H. P. U. S. Department of Agriculture, Bulletin 346, States Relation Service, p. 4, Feb. 21, 1916.

[illegible]

Problems, practicums, demonstrations and occasional experiments may be necessary as a part of the project. These in themselves may be within the dictionary definition of the term project but we have already these other terms in the vocabulary of education. The exact line of demarcation between a short project and a longer practicum may as well be left undecided, but the tendency to give to everything which may be 'projected' or planned the name project is unnecessarily confusing.

(3) "The records and reports covering each of the steps or processes with final conclusions or results should be preserved. All of these points will apply, whether the project is for an individual or a group; at school, at home, or elsewhere in the community. To start with a definite aim, to do certain correlated lines of work covering a fairly extensive field or period of time, and to bring together everything bearing on the main aim are essential points in a project."[1]

This characterization of the project, with the additional explanations, shows that reasoning is favored over the mere memory of information, for the writers consider it essential that some "problem more or less new" be present; and that the natural setting is provided for in making the projects apply to the farm, and that conduct is modified, for the completed act is assumed. The writers, however, do not make priority of the problem over the statement of principles an essential factor. Thus, Heald in section 2 above says: "The project should involve principles already

1. Heald, F. E. "The Project" in Agricultural Education. General Science Quarterly, Vol. 1, pp. 167-168, March 1917.

studied or which are studied concurrently with the practice," but all agree that there should be a new problem involved in the project.

(3) Definitions proposed by teachers of science:

The project has been developed and used rather extensively by teachers of science, yet very few definitions have appeared and even these probably could better be termed characterizations. The most comprehensive characterization has been given by C. R. Mann:

"(1) A desire to understand the meaning and use of some fact, phenomenon, or experience. This leads to questions and problems. (2) A conviction that it is worth while and possible to secure an understanding of the thing in question. This causes one to work with an impelling interest. (3) The gathering from experience, books and experiments of the needed information, and the application of this information to answer the question in hand."[1]

A few citations from the writings of John F. Woodhull will give his views of the project method in science:

"The purpose of science teaching in all grades of schools is not chiefly to impart knowledge of subject matter but to train persons in the method of the masters, which is invariably the project method. This is the method used by intelligent men in achieving their ends, in school or out."[2] In commenting on the method of the masters this reference will be explanatory: "The real way to learn fundamental principles is to attack those

1. Woodhull, John F. The Aims and Methods of Science Teaching. General Science Quarterly, Vol. 2, pp. 249-250, Nov. 1917.

2. Woodhull, John F. The Aims and Methods of Science Teaching. General Science Quarterly, Vol. 2, p. 249, Nov. 1917.

[illegible]

problems of which life is full for each individual, not through the preparatory fallacy called the scientific method, but by a 'forked road situation.' The school should prepare pupils to walk alone by attacking real problems as Archimedes, Galileo, Davy, Faraday, Pasteur, Tyndall, and all the rest did. Most of us know, if we would think back over our experiences, that we never really learn these so-called fundamental principles until they come to us as an interpretation of some of our life's problems."[1]

"A project, or problem, differs from and is superior to a topic in that (1) a project originates in some question, and not in such a logical sequence of ideas as may be found in codified subject matter. In teaching from the so-called 'logical' texts one wrongly attempts to induce pupils to accept topics as their own projects. Logical organization of such material as functions in life will be the final result of a protracted study of projects. (2) The project involves the active and motivated participation of the pupil in carrying it out. It does not, therefore, like the topic, lend itself to didactic, formal treatment in which the teacher does all the thinking and the pupil passivly absorbes. (3) Projects furnish a basis for the selection of facts according to value or significance, topics furnish no such basis for selection. (4) The project seldom ends in a complete, final or absolutely finished conclusion."[2]

1. Woodhull, John F. Science Teaching by Projects. School Science and Mathematics, Vol. 15, p. 229, 1915.

2. Woodhull, John F. The Aims and Methods of Science Teaching. General Science Quarterly, Vol. 2, p. 2, Nov. 1917.

Again, J. A. Drushel, science teacher in Harris Teachers College, St. Louis, Missouri, proposes this definition: "A project is a concrete problem outlined sufficiently fully and clearly to enable the student, for whom it is designed, to carry it out."[1]

J. A. Randall, Department of Physics, Pratt Institute, Brooklyn, New York, defines a school project "as a problem the solution of which results in the production of some object or knowledge of such value to the worker as to make the labor involved seem to him worth while."[2]

The definitions proposed in the field of science agree in that the project involves a problematic situation (in fact, Woodhull does not differentiate between the project and the problem), but Randall and Woodhull alone lay emphasis on carrying the act to completion. Randall makes no provision for the natural setting of the problem. The situation outlined by Mann and Woodhull may be properly classed as multi-problems,[3] by Drushel an application, while Randall's definition covers most of the elements which have been considered essential to the project, with the exception that the natural setting for the problem is not specifically indicated.

(4) The use of the project in industrial education:

The use of the project in industrial and vocational education has been developed by C. R. Allen and defined as follows: "In the simplest and most general sense in which the

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1. Drushel, J. A. Definition sent to writer by Supt. John W. Withers, St. Louis, Missouri, March 23, 1918.

2. Randall, J. A. Project Teaching, N. E. A. Report, p. 1010, 1915.

3. Multi-problem. To be discussed and defined in Chapter III.

term can be used, a project is a problem involving the discharge of a responsibility on the part of a given individual or group of individuals. It requires an intelligent application of knowledge or an exercise of skill, or both, in order that something may be accomplished."[1] This takes into consideration in a general way the elements which our proposed definition considers. However, attention must be called to the fact that there is seemingly undue emphasis placed on the application of knowledge and principles, rather than the development of principles as needed in the prosecution of the solution. To give undue emphasis to this phase would mean that Allen's definition of project is nothing more than the definition of a practical application. Allen in another statement seems to have indicated that his term project is more than an application. "In the field of vocational education the meaning of the term project becomes still more specific, in that it implies that the 'core' of the project lies in the field of the 'shop experience;' the project is built up around doing a job. Any job assigned to a boy in the machine shop may be made the center of requirements which will call upon him to deal with 'elements' representing the entire program of that department.

"If, instead of merely having him do the job as a purely production problem, we ask him in connection with the job to find out why he is using a certain kind of steel on that job, that is a lesson in materials of trade. If we ask him to figure his cutting speed, that is a problem in mathematics. If we ask

1. Allen, C. R. The Project Method and the Combination of the Project Method with the Phase System of Grading and Promoting. Massachusetts Board of Education, Bulletin 75, p. 46.

him to find out how the power is transmitted from the speed pulley to the cutter spindle, that is a problem in relatable mechanics or science. If we ask him to find out whether before there were any millers if this particular job would have been done at the bench with a file or with a saw, or whether it could have been done at all, that is a lesson in the history of that trade. If we ask him to figure the cost of his stock, we have a related problem in applied arithmetic. If we ask him to use a time card, or fill out a stock order, we are giving him a lesson in shop management. It is possible so to organize the requirements around any piece of shop work in the case of an individual pupil that small portions of any or all of the subjects to be included in his equipment will be represented in that pupils' experience in connection with that particular job, and that those necessary portions of all or any of these relatable or trade technical subjects will be brought to his attention at a time when they function directly and immediately upon the work in hand, when this is done we say the boy is working on a project, and this method of instruction is called the project method.

"In order that projects may serve a progressively educational purpose they must be so organized as to continually present new difficulties and offer new opportunities for achievement. For example, when the 'milling project' just discussed makes no demands on the boy for the acquisition of new knowledge, if he already knew how to take a rough cut on a miller, and could correctly solve the related problems included in the project, we would still have a project, but not one involving the acquisition of new knowledge.

"The project as used purely as a device for training the pupil in slecting and applying to the demands of a particular job only what he has already acquired, while a valuable device, is not the type of project discussed here, since it lacks the element of requiring the pupil to determine intelligemtly needs for additional knowledge required to carry out that particular project, and to secure such additional knowledge as a prerequisite to completing or carrying out the project in hand."[1]

From the foregoing quotation it becomes evident that Allen lays great stress on the priority of a problem over the statement of principles. As he states later: "If, however, it is desired to use the project to impart additional knowledge, then it is evident that the projects must be so arranged that the pupil will acquire his additional knowledge just at the time when he needs it to carry out that particular project."[1]

The definition proposed and outlined by Allen is very comprehensive, in that it includes review project as well as instruction project. The definition which this thesis proposes would not accept the review project as a project, which is rather an application or a drill.

(5) <u>Use of the project in the field of English</u>:

The adaptation of the project idea to other fields is rapidly receiving consideration. In the field of English literature and composition, J. F. Hosic has made use of the concept <u>project</u>. The following gives in detail his characteriza-

1. Allen, C. R. The Project Method and the Combination of the Project Method with the Phase System of Grading and Promotion. Massachusetts Board of Education, Bulletin 75.

tion:

"I understand by project a complete unit of experience. The essential aspects or elements of an experience are, in the simplest form, a situation and the response to it. This, however, will not describe adequately what is meant by the type of experience called complete. Such a unit includes the following phases: situation, problem, purpose, plan, criticism of the plan, execution, judgment of results, appreciation. This is, of course, not a chronological order strictly speaking, as a feeling of appreciation will spring up in anticipation of the outcome, while, on the other hand, purpose persists and plan is modified to the very end. Negatively, the project is not to be confused with mere problem, with motivation, with incidental learning, with correlation, with self-activity, or with the idea of general method as illustrated by the Herbartian 'formal steps.' To understand what the project method is we have only to go out into life and study any case of purposeful living. Perhaps, then, the word purposeful should be added to the original definition of a project - A complete unit of purposeful experience. This will distinguish the project from ordinary habitual reaction, as thinking, planning, criticizing, etc. are essential. I may add that the results to flow from the project will include growth in initiative, in power to think, in judgment of values, and in appreciation, as well as in concentration and power of organization, at least within the range of specific suggestions in which the experience functions. So far as these results are general that result will be secured by observing the laws which

govern the conditions of transfer."[1]

This characterization provides for reasoning as over against the memory of information and since the unit of experience provides for execution, it contemplates carrying the act to completion. In another summary, the author indicates that the project is "an organization of school life in accordance with life in the home and community,"[2] hence a natural setting for the problem is provided. The author in comparing the project with a purposeful activity in life seems to favor the priority of the problem over the statement of principles, although this is not specifically indicated.

1. Hosic, J. F. Statement sent to writer in letter, March 20, 1918.

2. Hosic, J. F. The Problem-Project Method of Teaching, Summary sent to writer, April 18, 1918.

# CHAPTER III

# IMPLICATIONS OF THE PROJECT

## Problems and Projects.

A critical study of some of the leading articles on the project method of teaching as applied particularly to the teaching of general science seems to show that no clear-cut distinction is made between the project and the problem method of teaching. John F. Woodhull, for instance, in a recent article discussing the methods of science teaching makes none and, indeed, it would be quite fair to interpret him as using the terms synonymously; for he states: "The present need of the schools is for a large collection of sample projects, or problems, which may be used in showing teachers in a given community how to devise and utilize projects adapted to different grade of pupils in their own environment."[1] In continuing the discussion Woodhull quotes the characterization of the project by C. R. Mann, which as stated before, may be considered to be a multi-problem.

Since there seems to be no clear-cut distinction between the project and problem as interpreted by some of the leading advocates and writers on the project method, it will be

1. Woodhull, John F. The Aims and Methods of Science Teaching. General Science Quarterly, Vol. 2, p. 250, Nov. 1917.

necessary for the sake of clarity to set up definitions which may make it possible to distinguish these two concepts.

The definition of the problem as proposed by John Dewey is quite adequate: "Every conscious situation involving reflection presents a distinction between certain given conditions and something to be done with them; the possibility of a change. This contrast and connection of the given and the possible confers a certain problematic, uncertain aspect, upon those situations that evoke thought. There is an element, which may be slight or which may be intense, of perplexity, of difficulty, of confusion. The need of clearing up confusion, of straightening out an ambiguity, of overcoming an obstacle, of covering the gap between things as they are and as they may be when transformed, is, in germ, a problem."[1]

The term problem is largely "intellectualistic in its connotation" and if it were used exclusively it would have a tendency "to over-emphasize the intellectualistic aspect of school work." The project, on the other hand not only lays emphasis on the problematic situation but also on the act being carried to completion. Its applicability is indicated by W. H. Kilpatrick, who holds that "actual life consists very much more of purposes sought in terms of physical and social embodiment than in terms of intellectual problem solving." The project may be considered as the whole activity which may be broken up into a number of problems and in this sense the problem is a subdivision of the project.

Or the project may be considered as the normal life

1. Dewey, John. Problem, Cyclopedia of Education.

situation, or the problem in its natural setting. What is frequently done in school is to take the problems away from their setting in projects, with the resulting tendency to teach them in isolated groups with little thought of their function. To avoid this isolation of elements, a larger unit of work, the project, is undertaken, on a functional basis and carried over into activity.

It is interesting to note that both problems and projects vary widely in the degree of complexity. The boy who oils a bearing or the boy who determines the efficiency of the dairy herd is each carrying out a project but the complexity of the latter is far greater than that of the former. Again the problems vary in complexity. For instance, the finding of the product of 3 x 6 is less complex than the determination of the relative superiority of the harbors of New York and San Francisco.

## Classes of Projects and Problems

Since there is such a wide variation in the complexity of the problems and projects it would seem wise for the sake of clarity to propose subdivisions which will indicate this degree of complexity.

Problems may be classified as (a) Simple, and as (b) Multi-problems. Projects may be classified as (c) Simple, and (d) Complex.

## Simple and Multi-Problems

The simple problem has its place in school. There are many intellectual difficulties that are not complex and yet need to be solved. The teacher may ask such questions as, "Where is Louisiana? Its Capitol? Its resources? Where is Alabama? Its Capitol," etc. The teacher may ask a number of simple questions

concerning the states in the southern group, and since they are in a sense difficulties proposed for solution, they may be considered as simple problems. But on the other hand, instead of proposing for solution a number of these simpler questions, the teacher may propose one large problem, which we call the multi-problem, and which may embrace all these simple problems.

The difference between the simple and the complex problem is well illustrated by the following example given by W. W. Charters. The following topical outline of seven topics from the New England States is cited without the details:

"(1) Size.

(2) Location - Latitude with respect to other states and countries.

(3) Configuration - Mountains, Water Bodies, Indentations, Area, Surface.

(4) Climate - Temperature, Seasons, Moisture.

(5) Soil - Fertility.

(6) Natural Resources - Mineral, Forest, Plant, Animal, Water Power, and Transportation.

(7) Cities - Commercial Centres - Reasons for their growth."[1]

There are many simple problems that could be proposed for solution; in fact, each topic would suggest one or more simple problems. But in the multi-problem attack some one complex problem which will involve most of the material and facts covered by the simple problem is selected. "For instance, to quote from an actual case, a superintendent proposed in the geography classes

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1. Charters, W. W. Systematic Topics, Multi-problems and Projects. Paper read before Illinois State Teachers' Association, Dec. 28, 1917.

which were studying New England, this question: Might New England have developed into a powerful nation? The solution of this problem, the superintendent reports to be interesting to the children. Several problems arose and all the facts in the outline above were utilized. The first minor problem was this: Is New England large enough? The students turned to the appendix of the geography, found the area of the United States, of their native state, and of New England, and decided in the negative. New England was too small.

"But how does it compare in size with some great European nations? was asked.

"The children named several important European Countries and finally selected for study the British Isles and particularly England, as the ruling power of the British Isles. Comparisons of area were made.

"The teacher than put the problem: As far as area is concerned, might New England have been a nation? Is New England large enough to become a nation? The class then reversed themselves and decided for the affirmative.

"Then the question was put, - Greenland is twelve times the size of New England. Is it a great nation? The pupils decided that size was not all-important and that they must know whether or not the people could raise what they needed to eat, and to know this they must get facts about soil, seasons, surface, and climate.

"A study of soils was made and a study of the other items of seasons, surface and climate followed. Before the books were opened the children were always asked to hazard opinions

about probable nature of soils, seasons, etc. (This took much time because of comparisons made with their native state.). They decided that New England could not feed itself and, also, after protracted study, they decided that New England could not clothe itself. It therefore could not become a great nation.

"But can England feed and clothe itself? The study revealed that it could not. But since she is a great nation, how is this overcome? By trade.

"What could New England trade (from your knowledge of New England already learned)? Products of fisheries, mines, forests, etc.

"Does New England have more fish than it needs for its own use? (A study of fisheries followed and the question was answered affirmatively). So, also, was carried on a careful study of mining, lumber manufacturing, etc. In each case the children formed their judgment and verified their conclusions."[1]

Another multi-problem, one in the field of art, may be cited. It was outlined and carried out in the 7th and 8th grades in Grand Rapids under the supervision of Charlotte Calkins. The problem of the two years' work was called the "House Beautiful."

(1) Pupils first read articles on what constitutes a good lot for building, evolving their own score card for judging it and then selected a vacant lot in Grand Rapids that would be the site for their house, giving particular attention to the cost.

(2) The pupils were given instruction in the principles of design, and the locating of the house on the lot was made one of

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1. Charters, W. W. Systematic Topics, Multi-problems and Projects.

the problems. The location of the lot was taken, drawn to scale and kept as the first exercise in the problem.

(3) Instruction and assigned reading were given for designing a house, principles of architectural drawing and cost. The pupils spent some time in drawing the plans for their own proposed house calculating its cost, giving particular attention to an inexpensive house.

(4) The problem of artistic furnishings was considered next.

(a) Wall paper - The pupils collected inartistic wall paper from the Sears-Roebuck Catalogue and other concerns. The principles of design and quality were thoroughly studied. The pupils collected some of the very poor wall paper, both in design, color and quality and wrote their criticism of it in their House Beautiful note book. Samples of wall paper of good design were also collected and reasons given for the good qualities. The lesson was emphasized that artistic wall paper costs no more than the inartistic. The pupils selected a pattern to harmonize with their general scheme of decoration, the problem of the units of the rooms considered, and appropriate colors and designs were selected for the different rooms. These rooms were laid out in miniature.

(b) Hangings - Artistic scrim was selected, exercises were given in designing, attention being given to appropriate and artistic designs. Scrim of poor design was collected and a criticism written in the note book. Methods of proper hanging were emphasized and illustrated.

(c) Pictures were selected, appropriate framing

was studied as also the proper method of hanging individual pictures and the problem of design for hanging a number of pictures.

(d) The periods of furniture were studied. Pictures of artistic furniture were cut from the leading furniture magazines and a brief description of the good qualities were emphasized. Good, yet inexpensive copies of the old furniture were studied.

(e) Rugs, potteries and dishes were studied in a similar manner.

During the two years which this study was carried on the pupils were brought in contact with most of the problems that arise in making the home beautiful.

It may be said, parenthetically, that in most instances this was a school problem, but that to some of the pupils it became a project. One such project was the following: A girl's mother was planning to redecorate and refurnish the home. The girl with the aid of the supervisor took complete charge of the undertaking. This is, of course, splendid teaching, it applies the art principles in a very concrete, interesting and almost spectatular manner. The whole problem as carried on by Miss Calkins could not be classed as a project because it was not in most cases carried to completion in its natural setting. To those who carried it to completion in its natural setting, it would constitute a project.

## Simple and Complex Projects

Not only do we find simple problems and complex problems, but in like manner we may find simple and complex projects. The girl who accepts the problem of peeling potatoes economically at home

may be said to be carrying out a simple project but, her task is much less complex than that of the girl who undertakes as her project the entire preparation of the meals for the family for a period of a month with particular attention to the reduction of cost. The latter is a complex project.

Obviously, it will be very difficult to draw an exact line of demarcation between the simple and complex problems and projects, but this guiding principle may be posited. When the process has sufficient complexity so that it may be broken up into a number of problems or simple projects, it may be classed as complex.

The classification of projects into simple and complex is recognized by C. R. Allen. "'Projects' may include major and minor projects, the latter being a subdivision of the former. For example, a boy might undertake to raise an acre of corn as his major project. A minor project connected therewith would be the preparation of the soil or the test of the seed."[1] The classification of projects into major and minor is essentially the same as the complex and simple, although it is quite likely that the group indicated by minor projects in Allen's grouping would include some projects which would be classed as complex in our classification.

In order that the proposed classification will be better understood, a number of simple and complex projects will be cited.

Simple projects. The task of sharpening tools, cutting

1. Allen, C. R. The Project Method and the Combination of the Project Method with the Phase System, Massachusetts Board of Education, Bulletin 75, p. 50.

to a line, planing a board, and fitting a joint in the manual training class may be considered as simple projects. The baking of a loaf of bread, setting the table, serving the meal and going to the meat market to procure a certain cut of meat may be called simple projects in home economics. Making an analysis of soil, testing out varieties of seed corn, spraying the tree with a given mixture,are representative for agriculture. In art, framing a picture according to principles of design, making curtains, the selection of artistic,but inexpensive wall paper, illustrate the simple project.

In industrial education, Allen gives a number of illustrations of the simple project:

"Telling a boy to oil a bearing would constitute a project in its simplest sense, in that that particular boy would be made responsible for the oiling of that particular bearing. Assigning a particular job to a particular boy in the shop of the industrial school involves the setting up of a project, in that that boy is expected to do that job; it is his job, and he is responsible for it. In the discharge of that responsibility he would have to apply certain special knowledge about the construction of bearings, proper methods of lubrication, etc., to that particular job. He would also have to exercise certain skill, and both the application of this special knowledge and skill would have to be carried out with intelligence. Giving a district messenger boy a letter to deliver sets up a project, in that he is expected to deliver that letter to the party to whom it is addressed, and in that way discharge his responsibility. In the discharge of that responsibility he must apply his knowledge of

streets, routes, methods of procedure required to reach that individual, whether in a business office, a hotel, a private house, etc; must exercise skill in avoiding accidents in going through the streets; and must exercise intelligence and judgment in the proper performance of his job."[1]

Complex Projects. A number of projects outlined by Stimson illustrate the complex project. "The improvement project of constructing a concrete walk to the front door might involve a study of the nature of cement; its action on sand, gravel, and broken stone; its resistant qualities to the weather; the seasons in which it might be used; its cost as compared with other materials, such as boards, plank, tar, brick, flagging, and asphalt; the mathematical determination of proportions of sand, cement, and stone to be used; the geometrical determination of the sections into which it should be divided, and whether it should be crowned or flat; the geographical sources of the raw material and the commercial conditions for purchasing the cement. The experimental project of planting an untried variety of fruit might involve a study of the probable adaptability of the variety selected to the soil of the farm, the climate of the locality, and the market demands within reach of the farm.

"The home project, or part-time plan of instruction, moreover fits in nicely in its relation to the usual farm activities of the boy. The boy may help with the milking throughout his course, where the object is to get the cows milked as

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1. Allen, C. R. The Project Method and the Combination of the Project Method with the Phase System, Massachusetts Board of Education, Bulletin 75, p. 46

quickly as possible and where no records are kept. During certain months of at least one year the school should require whatever time may be necessary for keeping an accurate record in pounds and ounces of the yield of a part of the herd. This may be limited to the weighing of milk from a single cow and giving the cow credit for what she produces.

"It may be part of the usual work of the boy to help cultivate and harvest the potato crop. During one season at least he should be given facilities for testing the value of the use of formalin for the prevention of potato scab and of the Bordeaux mixture for protection against potato blight."[1]

A very complete complex project is reported by C. W. Stone which he calls the Parcel-Post project. It has been thoroughly developed and cuts across many subjects in the curriculum. It will serve as a good example of the project worked out fully.

"Since the holiday season calls the attention of children and parents to the various ways by which packages may be sent to distant friends and relatives, it furnishes a timely opportunity for the study of the parcel post. With this as a source of motive, the study of the parcel post was undertaken in the fourth grade of the Teachers College Training School, shortly before the holidays last year. The main purpose was to bring the subject before the children in such a way as to prepare them to use the parcel-post service to the best advantage. Accordingly

1. Stimson, R. W. The Massachusetts Home Project Plan of Vocational Agricultural Education, U. S. Bureau of Education, Bulletin 579, pp. 13-15, 1914.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

it was worked out not only through general discussions in which the entire grade took part, but also in their class work in Hand Work, Geography, Arithmetic, and Language.

"In the first place it was worth while to consider just how much available experience the children had. They could read and write; they had a knowledge of simple mathematics, including measurements; they were familiar with directions and had some general knowledge of other places in relation to the locality in which they lived; they could do simple manual work; they had received packages by parcel post, or had seen packages prepared to be sent; and they had often seen the parcel post man delivering packages.

"The main aims which the teacher had in mind were (1) to teach the children how to wrap and address correctly packages to be sent by parcel post, (2) to teach them what might or might not be sent by parcel post, (3) to teach them the advantages of parcel-post service, (4) to give them practical problems in arithmetic, (5) to make a beginning of map reading by locating places where packages were to be sent, (6) to give them a larger conception of civic life, (7) to train them in obedience to laws and regulations, and (8) to teach them to help other people.

"The children were first led to feel the need of learning by a discussion of how to send Christmas presents. Questions brought out such facts as the weight, measurements, and contents of the package, its destination, and the cost of sending it. Much of this information was known, in a general way, by various members of the grade, and with the aid of the teacher, the rules and regulations were worked out and written on the board. Later

these rules were reviewed as a preliminary to the special lessons which followed.

"The first of these was a handwork lesson in which the children learned to wrap packages and tie knots. Articles ranging all the way from books and toys to small vases and tiny bottles of seeds, boxes of various shapes and sizes, an assortment of string, packing material, and wrapping paper were placed before the children. Each one was asked to select an article which he would like to send by parcel post and then to decide upon the most suitable box in which to pack it and the best packing material. After this choice was made there was a discussion of the best kind of paper to use, the way to wrap the paper around the package, the kind of cord to use, the way it should be adjusted, and the best kind of knot and how to tie it. When each child had his package properly wrapped the recitation closed for that day.

"The addressing of the packages constituted a Language lesson and included a discussion of what the address should contain, the place to write it, its legibility and punctuation. Not only the address of the person to whom it was to be sent, but also the sender's name and address were considered. Each child wrote these addresses on his own package.

"The Geography lesson included a study of the map and the parcel-post zones. The children were taught to locate familiar places on the map and to read and use the scale of miles which accompanied each map. Finally a large map of the United States was placed on the floor and the teacher, surrounded and assisted by the pupils, marked out the zones with Cedar Falls

as the center. They were encouraged to find various familiar places in the different zones.

"At the same time the subject was taken up in the Arithmetic classes and the children were taught to weigh, measure and compute the cost of sending packages to various places in different zones. To aid them in this work a chart was placed on the board, giving the rate according to the weight and zone. By this means the children became familiar with the zones, the size, the weight and the means of estimating the cost of sending packages. Some time was given to wrapping packages of various sizes, which were carefully weighed and measured in order to see if they could be sent by parcel post. After weighing the package, each child wrote the weight in the corner where the stamp was to be placed. One child was appointed postmaster and each, in turn, carried his parcel to the post office (the teacher's desk) where the postmaster again weighed it to ascertain if it had been correctly weighed, turned to the zone chart, and after finding the rate charged for a package of that weight to the address indicated, gave a paper stamp and the correct change for the paper money presented. As various members of the class acted in the capacity of postmaster every one had the opportunity to get practice not only weighing packages and finding the cost of sending them to different zones, but also in making change. All of this work furnished material for practical problems in arithmetic with an abundance of both thought and drill.

"As a means of testing and using the results of these lessons, packages were wrapped to be actually sent, the weight, size, and cost of sending were considered and they were addressed

and mailed. Some of the children sent gifts to friends, but the package which was of greatest interest was the one which the children sent to a well-known Iowa Orphan's Home. Those who were so inclined brought small articles, such as books, toys, dolls and articles made in Drawing and Manual Training. The children decided on the proper box in which to send them, the packing material, the best way to wrap and tie the package, and finally where the address should be placed. With this package went a request that some child in the home should write a letter upon the receipt of the gifts. As the letter contained a request for a reply several children wrote letters and a committee from the class selected one which was sent. This furnished a motive for a letter writing exercise.

"This study of the parcel post has given the children a practical knowledge which will enable them to render assistance at home whenever the need of sending a package by parcel post may arise. It has been a socializing influence. It has made them more observant of civic relations and has opened their eyes to the possibility of their being able even as children to bring pleasure to others. The whole series of lessons furnishes a good example of the kind of school work which is a part of actual everyday living."[1]

The writer, in the high-school course in physics, taught the electric bell and its uses by the project method. Each year one or more of the school buildings had to have the bell system completely overhauled, which meant installing new bells, new wires,

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1. Stone, C. W. Parcel-Post Project

repairing bells, finding short circuits and in many cases making parts for bells or constructing complete bells. This project was talked over with the class and leaders were appointed for each phase of the work. The principles of the electric bell were developed as needed in this task. Usually this experiment resulted in bell systems being placed in the homes.

It will be seen that the complex projects proposed have been of sufficient complexity to allow them to be broken up into problems and simple projects.

## Limitations of the use of project

In this section, it might be well to point out that the project method has its limitations and that there are certain types of subject-matter units which cannot be economically taught on the project basis but could better be taught by the problem method. This occasional superiority of the problem is clearly set forth by C. W. Stone:

"It may often happen that the same unit of learner's experience might well be treated as the Problem under one circumstance and as a Project under another....... In a community in which cotton will mature it is best studied as a Project, and the work will include the raising of the plant, picking of the fiber, simple ginning, etc. In communities in which these manual activities are not practicable, the work will be undertaken as a problem and the procedure will be dominantly one of inquiry, reading, etc."[1]

The multi-problem gives superior training in developing the technique of reasoning and "tends to make facts interesting

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1. Stone, C. W. Teaching Units

and significant."[1] The complex project, in addition to developing the technique of reasoning, carries the facts into action.

The Project and Motivation

The definition of the project takes into account the natural setting of the problematic act which means that it has significance for the learner. A statement by Charters is quite adequate to illustrate this point. "The natural setting provides a strong motive - canning fruit for the family is more interesting, we will say, than cooking a little fruit in a small laboratory utensil. Treating the mold on fruit 'I have canned for winter use' is more stimulating than studying molds as ends in themselves. Studying sterilization to use immediately in putting up fruit for friends has much more appeal than merely studying sterilization as a class exercise. Tying the process to outcomes and beginnings of a varied and intensely fundamental sort tends to produce a great spontaneous interest. All projects are not interesting to any one student, but if a project is selected so as to be of interest, the degree of the interest is likely to be very high because of the setting in the experience of the student. It is claimed that when the project is interesting, it is very interesting."[2]

The project creates interest of a deep-seated sort because the interest comes from associative connections of many sources. The project offers many more reservoirs from which

1. Charters, W. W. Systematic Topics, Multi-problems and Projects--Paper read before Illinois State Teachers' Association, December 28, 1917.

2. Charters, W. W. The Project in Home Economics. The Journal of Home Economics, Vol. 10, p. 117, March 1918.

interest may be drawn. If the boy wishes to study or experiment with the method of testing seed corn merely to pass an examination or make a grade in a certain course, the interest in the test or experiment flows in or is irrigated from, the grade reservoir. But if in addition, he carries on the experiment from fear of failure in the course or if he is making the test in order to help his father buy the seed corn economically, if he is planning to grow ten acres of corn from which he will receive the profit, if his own schooling or a trip for his mother depends upon the success of his project, then there are many more reservoirs of interest which are tapped by the project.

If the testing of the seed corn is tied up with many more numerous interests than that of merely making a passing grade, then it means a greater amount of interest. The potentiality of interest in projects is great because of the wide connections.

The project offers a means for the organization of subject matter which draws from many interests for it is tied up with many cues to behavior and offers a unit of work which should receive the maximum of motivation.

It should be pointed out that projects are not always intrinsically interesting, in spite of the claims made by the advocates of the project method. As Charters indicates "Projects may be interesting or uninteresting. There is no divine alchemy in the project. The project may be interesting to one class and not to another. It may be interesting to some children in the class and not to all. It can, of course, be shown that the possibilities of interest are much

greater than in the facts learned in topical organization or even in multi-problems, but it is subject to the general law of life, that interest resides in the person who studies and not in any object."[1]

## Project and Thinking

The conditions and function of thinking might well be summarized before discussing the relation of the project to thinking.

"Thinking is called forth in situations in which there is something consciously problematic in some phase of the process of adjustment of means to ends. Thinking is the process of consciously adjusting means to ends in problematic situations."[2]

The problems of the adjustment of means to ends are just as vital to the child as to the adult, as Miller states: "In so far as he deals with a real problem that cannot be solved by the more automatic processes of consciousness, he thinks, even if the solution is very simple."[3]

Thinking occurs in a doubtful or perplexing situation. It is the establishment of connections between means and ends. "Since the situation in which thinking occurs is a doubtful one, thinking is a process of inquiring, of looking into things, of investigation."[4] Mind is active, not passive, and its methods

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1. Charters, W. W. Systematic Topics, Multi-problems and Projects - Paper read before the Illinois State Teachers' Association, December 28, 1917.

2. Miller, I. E. The Psychology of Thinking, p. 97.

3. Miller, I. E. The Psychology of Thinking, p. 107.

4. Dewey, John. Democracy and Education, p. 173.

of procedure are experimental.

The function of thinking is stated rather clearly by T. S. Henry: "Every situation which is such as to demand reflection, then, involves a difference between certain conditions which are given, and something to be done to them. In other words, the reflective process implies the possibility of a change from the given to the possible and the desired, and the contrast between these two states of affairs confers a certain perplexing, difficult, doubtful, confusing, or in a word, problematic, aspect upon the thought-provoking situation. The activity of thinking is the process of making an adjustment which is necessary because of the presence of some such problematic situation, and that activity is prolonged as the adjustment is delayed until the situation can be reconstructed through the use of past experiences functioning ideationally. The problems of adjustment may be reduced to three general types, centering '(1) in the end to be attained, (2) in the appropriate means to be employed, and (3) in the organization of the means into a definite mode of procedure'; and at whatever points in the process of adjustment problems may arise, there thinking comes in to see that the process is carried forward. Furtherance of the process means only the accomplishment of effective relation of means to ends, for it is at some stage in the course of adjustment of means to ends that the consciously problematic situation occurs, and 'thinking is the process of consciously relating means to ends in problematic situations.'"[1]

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1. Henry, T. S. The Problem Method of Teaching, School and Home Education, p. 162, February 1917.

The student may propose and accept the project of installing an electric signal service in the home. In planning the installation he will have this problem of determining the amounts of material, the cost and initial steps of installation. After he has completed the project he may find that certain bells will not ring, which will cause him to review the whole situation. His problem for the time being will be to find the immediate difficulty and he will go to the individual bell that does not respond to find the trouble. He may go to his source material and read about the essential parts of the bell and with this information he may find that the make-and-break connection was not properly adjusted. Again he may find that certain windows when raised will not give the alarm and this causes him to shift his attack to this problem. He may trace out short connections, he may find the batteries were not properly connected, or the battery solution was not prepared scientifically. A certain button when pressed may cause a bell to ring continuously, and many other details may come up which will cause the boy to question himself, to examine his method, to abstract free ideas, to test his application of principles and to make readjustments to suit these given conditions.

Each new problem or experience in the project is leading the boy on to make new adjustments, to meet difficulties and to arrive at the solution. The projects, to be most educative, will lead to situations which will demand more thinking. For the project to be thoroughly educational it must lead the individual to full activity as it connotes a true project.

The project gives the ideal organization of subject-

matter to arouse an aim and to direct thinking. The thinking that is of most worth to the individual is the thinking that is directed by his own aim and not an aim held by some one else or an aim that is forced upon him. If the pupil has a specific aim which he understands and knows the difficulty which he has to solve, there is little doubt but that he will be able to select his material intelligently to aid in the solution. Unless his thinking works or accomplishes results, it is doubtful whether or not it is of much worth. Teachers frequently have the notion that if difficult problems can be put upon students which they attempt to work but fail, gives valuable training. There are, of course, few scientific data to give us an answer but the alleged value is doubtful particularly if we count the discouragement of the pupil which naturally results for an unaccomplished task. The sensitiveness of the pupils must be guarded. Teachers must now allow the pupils to lose confidence.

The organization of the schools and the curricula should be one in such a way as to provide opportunity for carrying out life situations, which will surely develop more effectual thought. It may be and perhaps will be a long time before our schools are so organized as to take care of these projects which typify life situations but there is no excuse for not using projects as far as possible without completely disorganizing our present system. Information whether gained in school or outside of school will be vitalized by its function. The project offers a convenient unit for carrying forward information simultaneously with its function. As Dewey says: "Every recitation in every subject

gives an opportunity for establishing cross connections between the subject matter of the lesson and the wider and more direct experiences of everyday life."[1]

"Processes of instruction are unified in the degree in which they center in the production of good habits of thinking. While we may speak, without error, of the method of thought, the important thing is that thinking is the method of an educative experience. The essentials of method are therefore identical with the essentials of reflection. They are first that the pupil have a genuine situation of experience - that there be a continuous activity in which he is interested for its own sake; secondly, that a genuine problem develop within this situation as a stimulus to thought; third, that he possess the information and make the observations needed to deal with it; fourth, that suggested solutions occur to him which he shall be responsible for developing in an orderly way; fifth, that he have opportunity and occasion to test his ideas by application, to make their meaning clear and to discover for himself their validity."[2]

The definition proposed for the project, ~~is~~ a problematic act carried to completion in its natural setting, takes account in detail of the emphasis which John Dewey lays down as the necessary requisites for thinking.

To show how the project takes into account these items, the following project is outlined: The boy accepts the project of determining the value of each cow in his father's herd of

1. Dewey, John. Democracy and Education. p. 191.
2. Dewey, John. Democracy and Education. p. 192.

fifteen, with the additional idea of improving the production by proper rations. The father possibly has agreed to credit him with half the savings which he can show, with the idea in mind that this money the boy earns will aid in his college education. This type of project may be over-drawn, possibly few projects can or will be tied up with so many points of interest, yet this is not a project at all impossible; in fact, this same project has actually been used. This project gives the pupil a genuine situation of experience. There is continuous activity in carrying the project forward and the pupil is interested. Second, there will be many genuine problems developing within this project which will be a stimulus to thought. The boy will keep a daily record of the rations, the cost of the rations, the record of each cow in products and possibly the determination to get rid of the non-paying cows and the investment in new and better stock. Daily there are situations which demand that the boy take an inventory of the conditions and make a hypothesis. Third, he must possess information and make observations in order to make a success of his project. If in doubt of his recommendations, he will go to the sources of information to help him solve the difficulty. It may be that a few days change of rations may seem to be expensive and not worth while, even though the production may show a slight gain. The authorities he goes to will probably point out that a radical or material improvement can not be expected immediately. Fourth, there will come to him daily, suggested solutions of the method of improvement. He will be compelled to develop these hypotheses in an orderly way in order to check results. Fifth, this project

affords ample opportunity and occasion to test his ideas by application. He will have occasion to test expert opinion on rations, breeds of stock and will be able to discover for himself the validity of these recommendations.

In order to carry his project to completion with distinct success, it is not only possible, but absolutely necessary that attention be given to the items which John Dewey points out are necessary for real thinking.

The project directs thinking. It develops the attitudes of scientific research which should be fostered in our secondary schools. The boys and girls in the secondary schools have plenty of projects which they will be very pleased to receive the teacher's assistance in solving. Projects furnish the natural means for developing a scientific attitude. The pupil gets more value if the project arises as his own, but by no means should we classify projects as worthless if the teacher suggests them. The value then depends on whether the pupil accepts it as his own and this is where the skill in teaching gives aid.

The relation of the project to thinking is indicated clearly by Charters: "An advantage claimed is that the natural setting and the great multi-problem with its coherent subordinate problems make the intellect function in a fuller tide of activity. The strong initial motive and the constant side lights from practical conditions and immediate practical outcomes make the student think with a higher degree of effectiveness."[1]

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1. Charters, W. W. The Project in Home Economics Teaching. The Journal of Home Economics, Vol. 10, pp. 117-118, March 1918.

The aim of the project must grip the pupil to be educative. The organization of the child's thinking will be better if he centers it around a central theme or problem. The pupil's own projects and not the teacher are what organizes his thinking.

The steps in the logical method of arriving at a solution of a problem are: (1) Defining the problem; (2) Collection of data; (3) Hypothesis; (4) Verification.

The project cannot be carried to completion without the use of the identical steps in logical thinking. If the above items were given as the method the project uses in arriving at solutions, the statement would be wholly correct. The project furnishes the opportunity for placing pupils in situations in which it is absolutely necessary for them to think in order to solve the difficulty.

This point is also emphasized by J. C. Moore in the following paragraphs:

"Pasteur, working on his asymetric crystals of tartaric acid, came near being caught in the obscurity of university research, but Dumas called him to a real project, the elimination of the silkworm disease that was causing a loss of 20,000,000 kg. of cocoons to France each year. He was not a technically trained biologist, but having felt the need, the problem became vital, he threw all his energies into the work, to the study he brought the resources from many fields, experimenting, testing, proving, until the result was obtained.

"Then followed that wonderful list of projects, growing out of the needs of his day. The story of every great invention

is the story of a project, and in it we find the following elements:-

"A felt need, real, vital, growing out of the unanswered part of one's environment.

"A growing interest and enthusiasm calling for one's best energies and resulting in activity.

"A broad, comprehensive search for related material.

"An organization of the results of personal activity for solving the given project. This summary does not differ greatly from Dewey's analysis of the complete act of thought."[1]

Project and Habit-Formation

It is a recognized fact that drill work has a very significant function in education and it is also true that we may have at times overemphasized its value. There is little doubt that a large amount of drill has been formal and not related to the student's problem. As Dewey well says: "Not less serious is exaggerated emphasis upon drill exercises designed to produce skill in action, independent of any engagement of thought - exercises having no purpose but the production of automatic skill."[2] The corrective measure to apply to situations of this type is certainly not to propose a scheme which will consciously neglect drill work and habit-formation or rather seemingly make no provision for taking care of drills and habit-formation.

The importance of habits as stated by Bagley is too fundamental educationally to evade: "The relation of habit to

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1. Moore, J. C. Project Science, Progressive. School Science and Mathematics. Vol. 16, p. 688, 1916.

2. Dewey, John. Democracy and Education. p. 209.

efficiency is direct. It is simple, simon-pure economy to reduce the constant and unvarying functions of life to the plane of automatism, - to take them out of the focus of consciousness and thus leave the higher centers free to dealwith the changing, varying problems of existence....... If habit, then, is nine-tenths of life, - as it certainly is, - the formation of habits should bear a somewhat corresponding ratio to the total task of education. The school deals with the individual during a plastic period, and it is during this period that habits of all kinds must be formed if they are to be formed most economically and effectively. 'Any great achievement in acting or in music grows with the growth. Whenever the artist has been able to say, 'I came, I saw, I conquered,' it has been at the end of patient practice. Genius at first is little more than a great capacity for receiving discipline."[1] "The purpose of the drill lesson is to insure the functioning of experience as habit. Consequently the technique of the drill lesson is strictly conditioned by the principle of habit-forming; focalization and repetition in attention."[2]

In evaluating the project method of teaching, the issue which Professor A. D. Yocum raises must likewise be answered: "Before the human mind can independently remember and think in the most useful relationships, it must have certainly, cumulatively and systematically mastered the relationships which it can

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1. Bagley, W. C. The Educative Process. pp. 121-122, 1905.
2. Bagley, W. C. The Educative Process. p. 328.

most usefully remember by and think with. The slavery of imitation, memorizing, drill, accumulation, and review must precede and accompany intellectual and moral freedom."[1]

The importance of habit-formation is too important to take it for granted that in using the project method they will be formed incidentally. A methodology which makes no provision for these other than in a purely incidental way is seriously defective and may greatly make its theory subject to the criticism that it is encouraging "soft pedagogy."

A place for habit-formation must be considered as indicated by Bagley: "The work of habit-building must always be accorded the most important place in elementary education. That habits formed in the school may not function in the situations of later life is clearly apparent. That training may not 'spread' beyond the limits of the specific function trained suggests the advisability of limiting the strenuous processes of habit building (1) to those automatic responses that will be of unquestioned service, and (2) to those responses that may serve as concrete bases for the later development of concepts and ideals of conduct...... The fault of American schools today lies, not in the mechanical grind that they are popularly supposed to represent, but in the inadequacy of the really small measure of drill work that is attempted....... In education as in all other departments of life, you cannot make bricks without straw; and among nations as among individuals, success

1. Yocum, A. D. Culture, Discipline, and Democracy. pp. 237-8, 1911.

and preëminence can be attained only by those that are willing to pay the price."[1]

A suggestion offered by Charles A. McMurry may well be considered by the advocates of the extreme use of the project method: "In teaching arithmetic, after a preliminary concrete illustration of a topic, it is necessary to break away from the concrete and master number facts and processes by repeated drills for swift and accurate use. Children should not be allowed to dawdle among the concrete facts, counting on their fingers, when the time has come for the memory to fix the results and deal with a process as a rule of action. In other words, when the concrete phase of a topic has been once adquately presented, we must at once swing over into a new line of effort, namely, the mastery of processes and principles in their general or abstract form. Application again to the concrete follows this and completes the circle of practical action."[2]

The value of drill and habit-formation is recognized by R. W. Stimson in the project method of teaching agriculture. In the forenoon and afternoon groups - the first period in each session is taken to give a general study of agriculture production and rural life. A period before the close of each session is set aside to subject individual ideas and plans to the criticism of the entire class, to clarify principles, intensify impressions through drill. This period is used to give a single

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1. Bagley, W. C. Educational Values, pp. 137-8, 1911.

2. McMurry, Charles A. Conflicting Principles in Teaching. pp. 166-167.

focus of attention by the members of the class. This is a step in the right direction and these periods for the single focus of attention should be frequent enough to guarantee that skills and habits will be formed, otherwise the students will be interested in the projects but will fail to get the habits and skills which they are entitled to receive.

It should be said, however, that the drills and exercises in habit formation will probably be undertaken with more zeal if first introduced through a project than if they were merely set up as tasks to do quite apart from the pupil's problem: the pupil sees the reason for the drill.

The weakness of the project in making provision for drills and exercises in habit-formation is genuine. The attempt to minimize the importance of skills and habits does not answer the problem. The project method, to be accepted widely, must make provision for skills and habits.

### Project and Action.

The technique of carrying an act to completion needs to be taught as well as the problem, for the process of carrying out a problem to completion is as difficult as the learning of the theory. The theory underlying the preparation and serving of a breakfast may have been learned thoroughly by the girl in household science. She knows the method of making coffee, preparing the fruit, cereals, toast and eggs. She has learned the proper method of setting the table and the rules for serving. In the laboratory she has carried out each of these small exercises with success and could recite thoroughly upon the principles underlying each.

When she accepts the project of preparing the breakfast, setting the table, and serving there is a technique involved in trying to carry all these activities out at the same time. Her problem would be to use her time economically and yet not have the eggs, toast and coffee prepared before the cereals or the fruit. Taking for granted that she would eat breakfast with the family, her method of procedure would be as follows: First, she places the teakettle on the stove and while the water is heating she assembles the materials for the breakfast and places the breakfast dishes on a tray. The water being heated by this time she prepares the breakfast food, which usually requires stirring for four or five minutes with rapid heat, and then she places the cereal in the top of a water bath. She then prepares the coffee. Next she puts the bread in an oven or in a toaster, drops eggs in boiling water for poaching, and assuming that three to five minutes will be sufficient to cook the coffee, eggs and toast, that time will be used in setting the table.

This is a real problem that faces most girls who have completed a course in household science. Many young girls state that the most difficult thing they had to learn was to be able to have three or four foods cooking at the same time and starting them so that each will be done at the proper time. After girls have the theory, the carrying out of the work is difficult. In most of our teaching we usually have left this carrying out process to the pupils. But this cannot be any more safely left to chance than can the learning of the theory.

The project method takes care of the technique of carrying out a complete act. If the boy has been taught

agriculture by the project method, he knows how to do things. He does not know merely the theoretical phases of growing potatoes; he has learned the method of performance. The project provides for the technique of the completion of the act after the theoretical problem has been solved.

This value of the project is well summarized by W. W. Charters: "The acquisition of skill in carrying out processes in actual practice is an advantage claimed. After the student has learned fruit canning or bread making or hat designing in school as a project she is able to can fruit, make bread, and design hats at home. She does not know mere theory; she has learned the method of performance. The advocates of the project method assert that after the theory is learned there is a wide zone of danger in carrying out the solution, a zone full of difficulties which may ruin the effectiveness of the performance. They point to the fact that some students of home economics whose mastery of the theories is conceded by the most critical, are very inefficient home makers. These advocates explain this by saying that the performance of the act itself involves a very important technique which needs as careful attention as does the solution of the theoretical problems or multi-problems. Nor can it be any more safely left to chance, they say, in the expectation that the student will pick it up for herself at some future time than can the learning of the theory. It is essential to a successful hold upon the subject."[1]

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1. Charters, W. W. The Project in Home Economics. The Journal of Home Economics. Vol. 10, p. 118, March 1918.

## Project and Ideals

Ideals are developed by the satisfaction coming from doing a thing well. The project should develop not only the technique of doing a certain task well but should develop the ideal to continue improvement. Many girls have learned in household science the underlying principles of household sanitation and at the time these problems were no doubt of great interest to them as school problems. They perhaps solved the problems with a high degree of skill. And yet they may never have once tried to improve the conditions of their own homes. When an attempt is made to carry out a whole scheme for good household sanitation there are many practical difficulties that have to be overcome, with the result that the girls soon feel that there is surely a dualism between theory and practice. They enjoy the contemplation of having at some time a sanitary house but for the present they are content with the other.

"The advocates of the project claim further that the performance of the act involves not only the theory and practice of the technique of performance but also the very essential desire to perform the act under home conditions. They claim that a student may solve multi-problems of house sanitation with marked ability and still have no desire to make her own home sanitary or, at least, no desire strong enough to stimulate her persistently until the home is made sanitary. This making of the desire concretely effective, which is included within the project method has, they say, a technique for its mastery as difficult to learn and as necessary to be taught as the solution of the

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multi-problem or the performance of the act."[1]

The project includes within its province the making of the desire for a sanitary house concretely effective. This is as necessary and as valuable as teaching the principles. The project shows how the theoretical may be applied, it is applied, it proves its effectiveness because the project is solved in its natural situation. The project gives students confidence in carrying through a problem; satisfaction results; conditions are made better, they are happier and the next step is the development of Ideals.

## The Project and the Curriculum.

The organization of the material for the school curriculum is a problem of profound significance. It is quite as important as the selection of the material which goes to make up the school studies, for material which is of intrinsic interest to the pupil may be made almost valueless if poorly organized or presented in such a way that it makes little appeal to the learner.

There are at least four bases for the construction of a curriculum - facts, principles, processes and projects. The first three cited usually are included in the type of organization which is known as the logical or systematic arrangement of material.

The logical organization represents a perfected organization; its materials are arranged into subdivisions, topics, paragraphs, according to the demands made of the material

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1. Charters, W. W. The Project in Home Economics Teaching. *The Journal of Home Economics*, Vol. 10, p. 118, March 1918.

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from a logical standpoint. Logical organization demands that the material be put together in such a way that there are no omissions and each topic be given its relative place in some sort of a scheme previously determined.

In order to show the difference between the construction of the curriculum based on principles or processes and on projects, the systematic organization of a course in woodworking will be indicated and the effect of the use of the project on this organization will be shown.

According to the systematic organization in woodwork the following 32 processes are involved. The method of dealing with these from the logical or systematic viewpoint would be to give examples, illustrations and drill on each process until fairly well mastered and then pass on to the next process:

1. Planing
2. Scoring
3. Sawing
4. Boring
5. Sandpapering
6. Scraping
7. Bowsawing
8. Gauging
9. Nailing
10. Screwing
11. Gluing
12. Counter sinking
13. Spokeshaving
14. Chiseling
15. Gouging
16. Finishing
17. Laying out
18. Chamfering
19. Beveling
20. Modeling
21. Carving
22. Mortising
23. Mitering
24. Fitting
25. Superposing
26. Dowelling
27. Inlaying
28. Assembling
29. Dadoing
30. Grinding
31. Whetting
32. Filing

The project method of teaching these 32 processes is to select projects the carrying of which to completion will involve the processes indicated above. Mr. L. R. Fuller, formerly of the University of Missouri, has selected projects which will give this training. It might be of interest to know that these

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projects were selected because they involve the type of repairs and work needed in the homes. This selection was made after a study of the needs of 430 homes. Two groups or projects prepared by Mr. Fuller will be given. It will be observed that in the first column the processes are given, then the project, and in the last column the processes involved in each project. After each process the number of times it is used in this series of projects is also indicated. It should be emphasized that all the 32 processes have been used in the two series of projects.

On the two following pages selected projects are given, with the number of times each of the processes has been used in the series of project. After each project the number of processes used is indicated.

The project method in elementary woodwork.

| Processes | | Project | Processes involved |
|---|---|---|---|
| 1. Planing | 6 | Building walks | 1-2-3-9-24 |
| 2. Scoring | 6 | | |
| 3. Sawing | 6 | Door repair | 1-2-3-5-9-10-11-14-16-17-23-25 |
| 4. Boring | 4 | | |
| 5. Sandpapering | 4 | Screen repair | 1-2-3-4-9-10-14-16-18-23-24 |
| 6. Scraping | 2 | | |
| 7. Bowsawing | 1 | Floor repair | 1-2-3-4-5-6-9-14-16 |
| 8. Gaging | 2 | | |
| Fastening | 5 | Furniture repair | 1-2-3-4-5-6-7-8-9-10-11-12-14-16-17-20-22-24-25-26-27-28 |
| 9. Nails | 5 | | |
| 10. Screws | 4 | | |
| 11. Glue | 2 | Conveniences for the home | |
| 12. Counter-sinking | 1 | | 1-2-3-4-5-8-9-10-16-17-18-19-29 |
| 13. Spokshaving | 1 | | |
| 14. Chiseling | 4 | Handles in tools | 5-6-12-17-20-24 |
| 15. Gouging | 0 | | |
| 16. Finishing | 5 | Sharpening tools | 30-31-32 |
| Filling | | | |
| Staining | | | |
| Shellacing | | | |
| Varnishing | | | |
| Waxing | | | |
| Painting | | | |

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| | |
|---|---|
| 17. Laying out | 4 |
| 18. Chamfering | 2 |
| 19. Beveling | 1 |
| 20. Modeling | 2 |
| 21. Carving | 0 |
| 22. Mortising | 1 |
| 23. Mitering | 2 |
| 24. Fitting | 4 |
| 25. Superposing | 2 |
| 26. Doweling | 1 |
| 27. Inlaying | 1 |
| 28. Assembling | 1 |
| 29. Dadoing | 1 |
| 30. Grinding | 1 |
| 31. Whetting | 1 |
| 32. Filing | 1 |

The numbers to the right of the processes indicate the number of times they are employed in the projects listed. Each is counted only once to a project.

| Processes | | Projects | Processes involved |
|---|---|---|---|
| 1. Planing | 8 | Cutting Board | 1 |
| 2. Scoring | 7 | Hat Rack | 1-2-3-4-5-18 |
| 3. Sawing | 7 | | |
| 4. Boring | 6 | Laundry Register | 1-2-3-4-5-8-18 |
| 5. Sandpapering | 7 | | |
| 6. Scraping | 3 | Coat Hanger | 1-2-3-4-5-7-13-14-17-20 |
| 7. Bowsawing | 2 | | |
| 8. Gauging | 4 | Knife and Fork Box | 1-2-3-4-5-8-9-17-24-28 |
| 9. Fastening | | | |
| 9. Nails | 2 | Tea Pot Block | 1-2-3-5-6-14-16-17-18-27 |
| 10. Screws | 2 | | |
| 11. Glue | 3 | Flower Pot Stand | 1-2-3-4-5-6-8-10-11-16-17-24-25-26-28-29 |
| 12. Countersinking | 1 | | |
| 13. Spokeshaving | 3 | | |
| 14. Chiseling | 2 | Table | 1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-22-24-25-26-28-29 |
| 15. Gouging | 1 | | |
| 16. Finishing | 5 | | |
| Filling | | Tray | 15-16-17-21 |
| Staining | | | |
| Shellacing | | Hammer Handle | 5-6-13-17-20-24 |
| Varnishing | | | |
| Waxing | | Picture Frame | 23-16-17-19-11 |
| Painting | | | |
| 17. Laying out | 8 | Sharpening | |
| 18. Chamfering | 3 | Knives, Tools | 30-31-32 |
| 19. Beveling | 1 | | |
| 20. Modeling | 2 | | |
| 21. Carving | 1 | | |
| 22. Mortising | 1 | | |
| 23. Mitering | 1 | | |
| 24. Fitting | 4 | | |
| 25. Superposing | 2 | | |
| 26. Doweling | 2 | | |

27. Inlaying 1
28. Assembling 3
29. Dadoing 2
30. Grinding 1
31. Whetting 1
32. Filing 1

The numbers to the right of the processes indicate the number of times they are employed in the projects listed. Each is counted but once in a single project.

It will be noted that in the topical method one would teach these 32 processes by exercises in those particular processes. Teaching these processes by the project method, they are learned in connection with life situations and are not merely facts or processes to be learned but they are actually used. These are problematic acts carried to completion in their natural setting.

If we take one of the projects on page 101, the building of walks, we find that processes 1-2-3-9-24 of the systematic outline are used. It will be noticed that some of the processes are used many times in the completion of the 8 projects. Since planing and sawing require more practice and are in more need than some of the other processes, it is perhaps fair to state that these projects were selected with the purpose of giving drill where most necessary.

The following projects will illustrate the principles which C. W. Stone carried out in organizing the projects so they will cut across many subjects in the curriculum. These projects will illustrate what Dewey calls "facts not torn away from their original place and experience."

<u>Plan for Life Topic for Grade I.</u>

"Center of Interest: Seasons, Spring

Topic: Making a Flower Garden at Home.

(The following outline shows the work on this topic.

The subjects in which it works out are: industrial arts, arithmetic and music.)

I. Learner's Available Experience.

1. All the children have seen gardening done at home.

2. Many of them have had little plots of their own in the big garden at home.

3. They have had considerable experience in the school garden in preparing soil and the several groups have planted radishes, lettuce, cosmos, petunias and candy tuft. One group planted nasturtium seed between the ivy plants around the building.

II. Teacher's Main Aims.

1. To teach to measure with foot rule.

2. To add to their interest in gardening by application at home of knowledge gained at school.

3. To get good expression, both in language and in reading.

4. To increase enjoyment through a story and a song which express their own fresh experiences.

III. Stages of Teaching.

1. Enabling pupils to feel their need of learning.

Conversation in which the children are encouraged to tell of their little gardens at home, and of their work in the school garden. Proposal to give them seed to plant a garden of nasturtiums at home. How shall the garden be made in order to have beautiful nasturtuims? (Pupil's aim: To make a garden of their own and raise beautiful nasturtiums.)

2. Enabling pupils to acquire knowledge to satisfy their felt needs.

Industrial work.

Conversation on how to plant their seed, turning on the importance of not crowding plants. Making of rules for measuring home gardens. (Good seat work.)

Arithmetic.

How far apart shall we plant them? Approximate space decided on. Lessons with foot rulers teaching how to measure the exact distance between seeds.

Literature.

Story of Marjorie's garden to increase interest and add to knowledge by learning how Marjorie managed her garden.

Music.

The motion song: "In My Little Garden Bed."

3. (a) Testing results.

For Industrial Work and Arithmetic:- Have children measure an imaginary garden on the floor, placing small articles as bits of chalk for seed.

For English:- Thinking for themselves and deciding whether they can read the stories.

For Literature:- Retelling the story in class to see whether they are ready to tell it for the enjoyment of the others.

For Music:- Singing in class to see whether they know the song well enough to sing for the enjoyment of the other section, at home, etc.

(b) Applying Results.

For Industrial Work and Arithmetic:- Making the garden at home.

For English:- Reading the 'stories' to each other.

For Literature:- Telling the story to the other section,

at home, etc.

For Music:- Singing for the other section, at home, etc.

Plan for Life Topic for Grade III.

"Source of Motive: Seasons, Spring.

Topic: Return of the Birds.

Subjects in which worked out:

Nature work. Literature. Reading

Manual work. Drawing. Language.

I. Learner's Available Experience.

1. Children have all seen a few of the common birds, probably robin, English sparrow, bluejay.

2. Children know that the birds go south in the Fall and return in the Spring.

3. Children can read and write.

II. Teacher's Main Aims.

1. To help the children to watch for, enjoy and appreciate the return of the birds, their songs and their nest building.

2. To increase the capacity of the children to appreciate good literature, specifically that which deals with birds.

3. To increase their appreciation of color and form and their skill in representing the same.

4. To help the children to hear and enjoy bird songs which have been unheeded before.

III. Stages of Teaching.

1. Enabling pupils to feel their need of learning.

Conversation about: (a) Birds seen this spring if any. (b) Where they have been. (c) Why they are coming back.

List made on board.

Talk on importance of keeping the list exactly right and not putting down one bird if not seen by the writer himself. Tell of State Bird lists kept. Show some. Would you like to keep a Cedar Falls list?

Pupils' Aim: To know the birds as they return this spring.

2. Enabling pupils to acquire knowledge to satisfy felt needs.

In Field lesson. Out of doors.

Old nests noted. Position in tree or bush. How built? Of what made? Will this bird come to the same place to build again this year? Watch and see.

(Study Robin's nest and Oriole's nest on campus).

New birds seen: Bluebird, Robin, Flicker. (?)

Color, size, song and habits noted and recorded.

In Literature:- Learn 'A Secret.' 'The Robin.' 'The Bluebird.'

In Reading:- 'The Lazy Robin' Art. Lit. III. 'Bird Songs' Blodgett III. 'Robin's Rain Song' Art. Lit. III. 'Robin's Secret' Elson II pp. 68-69. 'Little Bird Blue' Elson II p. 70.

(Select as interest suggests and as time allows)

In Music:- Learn - 'How do Robins Building Their Nests?' 'I know the Song that the Bluebird is Singing.' 'The Bird's Nest.' 'Robin Redbreast.'

In Arithmetic growing out of Manual Work:-

Conversation - Would you like to have a blue bird come to your home to build?

Could you make a little house for him? Decide upon size and dimensions. Sample shown.

Different parts measured and a drawing made to show shape and size of parts. Drawings taken home to be worked out. Children asked to bring them to school when finished so we can seem them all.

In Drawing:- Of old Robin's nest for illustrating record book. Paint Bluebird from stuffed specimen.

In Language:- Oral composition in discussions held. Written descriptions of field trips. Writing of poems learned in books.

In Spelling:- Words used in language work: Robin, Bluebird, Flicker, etc.

In Manual Work:- Conversation on what we are to keep our records in (booklets). Making of booklets discussed. Size, form, etc. needed. Making of booklet.

3. Testing Results - In:

Nature:- Help others to find the new birds seen.

Arithmetic and Manual Work:- Bring bird houses to school. Measure to see how many are like drawing made. Discussion bringing out good points.

Reading:- Study to decide whether we can read well enough to read to Grade - . Read to Grade - I or II.

Literature:- Quote poems in class to see whether we can give them well enough to entertain Grade I.

Music:- Singing songs to see if we know them well enough to sing for Grade I, at home or at our entertainment.

Drawing:- Class discussion of work done finding good

points and mistakes. Select best one for a chart of birds.

4. Using Results:

Nature:- Watch and listen for new birds.

Manual Work:- Put up bird houses. Use booklets to literature. Give poems to Grade I.

Music:- Sing songs for Grade II.

Drawing:- Arrange work carefully and neatly in books or on chart.

Reading:- Read stories to some other grade or at home as interest and circumstances suggest."[1]

Another example taken from the field of industrial education shows how the project cuts across many of the subjects of the curriculum, in other words, how it destroys the logical order of organization. This method is described at some length by C. R. Allen:

<u>Two Plans of Organization</u>

"(a) By Independent Subjects.

Ever since schools have been known, two plans of organization have been recognized. The first plan has been to select certain subjects which it seems desirable to teach, and to develop each subject independently of the others. Thus, in an ordinary high-school program we may have history, English, mathematics, civics, and drawing so organized that each subject is itself a progressive unit, but no provision is made for connecting the different subjects in the mind of the student.

1. Stone, C. W. Outline sent to author.

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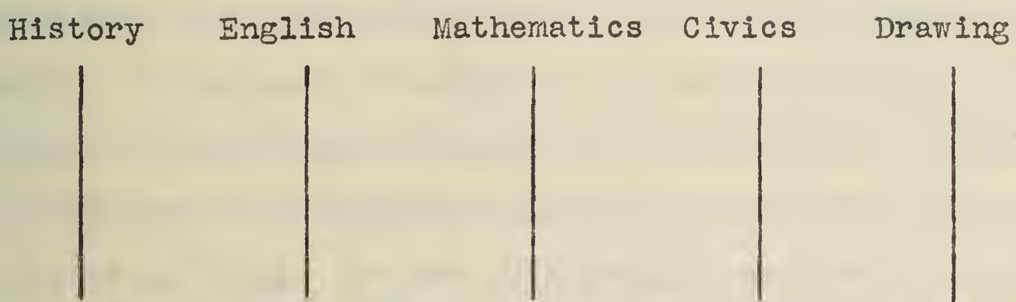
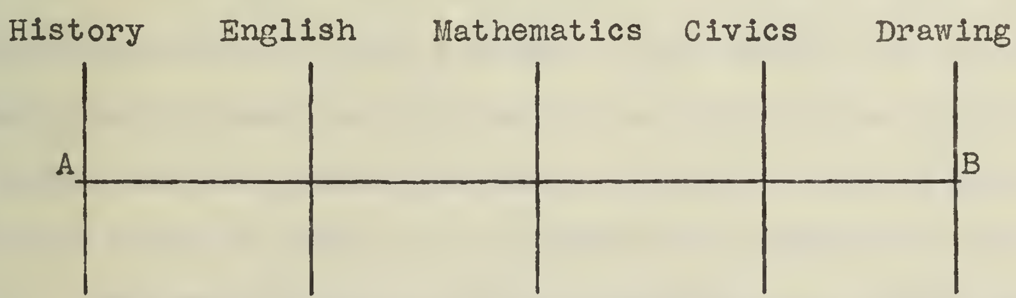
Thus, the drawing is developed from the standpoint of the principles of projection, and the various exercises that are given are simply regarded as demonstrations of the application of those principles. History is taught chronologically, but is in no way connected with, say, the civics work, whereas the civics, in turn, is taught descriptively, but with no reference whatever to the history. Such a scheme of instruction might be presented by the diagram given below:




"Under this scheme of organization each subject is treated as an independent subject. Teachers have long recognized that this method of teaching by independent subjects was not an efficient method of teaching, because of the fact that logical progression in one subject does not in the least imply a corresponding logical progression in another.




"Let the line AB in the figure represent the particular things learned by a pupil on a given day in a school organized by independent subjects. There is very little chance that the things he learns in civics, history, mathematics, drawing, etc., will have any relation to each other. It is very

improbable, for example, that if his history lesson deals with the method of administering justice in England in the Middle Ages that his civics lesson at the same time will deal with the modern method of court procedure which is derived from the old English procedure; that if his civics lesson deals with a question of community planning, his drawing lesson will in any way involve, for example, the laying out of a park plan on paper.

"If these different independent courses could be so arranged that the different lessons learned on the same day could all relate to the same principle or to the same idea, we would have what is known among teachers as 'correlation.' Suppose we have a machine shop department in which among other subjects there is being taught the use of formulae, shop work, materials of trade, history of trade, blue-print reading, and that the instruction on these subjects is organized upon independent basis as described above. In this same shop a boy is working on a certain job. Under this organization it is practically impossible for him to secure technical information at the point it is needed, viz., in his drawing, that which applies to that particular job; in his materials, of trade a study of the reason why six-point carbon steel is used in that particular job; in the history of his trade, how that operation was performed a hundred years ago; or in his class in formulae, assistance in working out the formula which would apply to his particular job. Under the organization by independent subjects he may get, week after next, the particular formula which he used on his job in the shop, and he may have had, week before last, the study of the properties of six-point carbon steel, which he has more or less

forgotten by the time he comes to the job requiring its use.

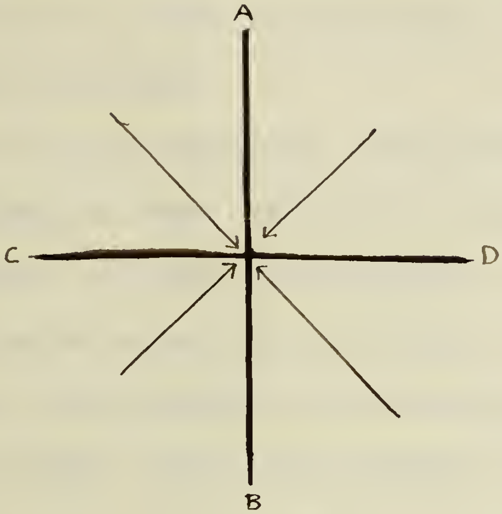
"It is evident that the greater the number of subjects, the more unlikely is the line AB to strike simultaneously the particular requirements for any particular job. If we were teaching shop work and materials of trade only, the materials of trade might be so organized and the shop work might be so organized that we would get fairly good correlation, but if we introduce history of the trade, the possibility of so handling the development of three subjects reduces very much the possibility of simultaneously reaching the particular work which applies to the pupil's particular job at any given time; and as we run up to four, five, six or seven subjects, the possibility of doing this becomes almost zero.

"Teachers are familiar with a number of correlating devices. Some schools organized on the basis of independent subjects have developed special correlating, or 'applied' courses, which are designed to perform a 'binding' function between the shop and the non-shop work. The organization of the work of a school into a series of short courses or 'units' is another device. The ordinary 'review' of the general school is, in essence, a correlating device. The purpose of all such devices is to reduce what has been sometimes designated as the 'amount of carryover'; that is, the periods which elapse between the time when a thing is learned and the time when that thing, along with other things acquired at different times, is applied in solving a problem. The need of this correlation is not so keenly felt with the graduate student as with immature students.

"(b) The scheme of major and minor subjects.

As contrasted with the method of independent

subjects, there is a second method based upon the idea of selecting some one subject which is considered to be of primary importance and of subordinating the method of presenting all other subjects to that 'major subject'. In the illustration




cited above, we might say that the most important thing in a given school is the shop work, and that we will make the requirements of the shop work determine the order of all other lines of instruction. In such an organization, when the boy has the turning of a taper in the machine shop, he gets at that time, in his materials of trade, the study of the problem of the selection of proper stock; in his mathematics, the figuring of the offset; and in his history of trade, the information as to how they got a taper before they had a lathe. Under this method the only line of work which would show logical progression would be the shop work. If we were to take the materials of trade, the mathematics or the history, and should arrange those topics as they might come to the boy, they would offer an entirely disconnected series, the only progressive subject being his shop experience. This scheme is indicated in the diagram, where

this line AB would indicate the progress of the boy in the shop work, the line CD would indicate the point where he had reached the problem of turning a taper, and the various arrows pointing to that particular point would indicate the parts of such subjects as materials of trade, mathematics, etc., which bear upon that particular problem.

"Since the above method of instruction is based upon the idea of selecting the most important subject and subordinating all other subjects to that, it obviously affords opportunity for a much closer correlation than the first scheme. It is much more likely to meet the condition in the earlier stages of the average pupil's progress, where the dominant subject is unquestionably shop experience. In suggesting this method for use in the vocational schools, there has simply been recommended the plan which has been always recognized as the more efficient of the two."[1]

The main reason which the writer gives for this method is that in an industrial school this teaches the student to know how to do the processes necessary to carry on his trade and insures that he will be paid for what he can do. If the primary aim were to impart information, the method of independent subjects might be used effectively.

The writer indicates which of these two methods is named the project. "To experiences in a major subject, around which are grouped the fragments of minor related subjects

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1. Allen, C. R. The Project Method and the Combination of the Project Method with the Phase System. Massachusetts Board of Education, Bulletin 75, pp. 40-45

that apply, we have given the name 'project', and the method of instruction based upon a series of such projects we have called the 'project method.'"

The educational use of the project, according to this writer, implies that in connection with the discharge of a responsibility, problems must be solved, the solution of which involves an educational experience, and that there is a problem in some major subject of instruction, the solution of which requires the student to acquire and apply fragments of minor subjects. According to the aim of the course of instruction, the portion of the major subject, or 'core' of the project, may lie in any field of instruction. For example, the major subject might lie in the field of English composition. In writing a composition the pupil must write, spell, apply grammatical rules, use figures of speech, and, in general, apply to that particular problem (writing the composition) fragments drawn from the fields covered by the subjects commonly taught under the names of 'spelling', 'penmanship', 'English grammar', and 'rhetoric.' In a similar way, projects might be organized around a 'core' taken from the field of history or mathematics or civics.

These above cited examples might seem to convey the idea that for complete success with the project method, it would be necessary to have it cut across two or more subjects of the curriculum. This does not seem a necessary conclusion, nor is this cutting across many subjects of the curriculum a necessary element in the efficiency of the project method. It is quite true that the projects may be so selected that they include two or more subjects of the curriculum, but it is likewise true that

for a method to be adopted by schools, the work can be made just as effective if the project is kept within the limit of a given subject.

The criticism of schools and school curricula for their failure to give instruction which is practical is due in a large manner to the fact that we rarely eliminate from our textbooks but are constantly adding. It takes a long time to eliminate from the textbooks and courses of study operations and materials which have become obsolete. The criticism is due also to the lack of an opportunity to use the material of the curriculum in solving difficulties arising in their natural setting, in the pupil's home and school life. "This shortcoming may be laid at the door of that false conception of the object of education as mere knowledge. Such a conception defeats its own end, as knowledge is defined as past experience organized to meet the demands and problems of new experience. Instruction is not complete until application of facts learned has been made and their usefulness demonstrated by the solution of problems of a practical character which develop out of the study itself and which possess a powerful appeal to the pupil."[1]

If the projects which the farmer is called upon to carry out in his work were carefully classified and the data selected from a large number, in different localities, this series of projects, with the principles which they define and illustrate would be a very splendid basis for use in the

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1. Parker, Francis W. Yearbook, Vol. 4, p. 5

organization of the curriculum in agriculture. It would not be impossible, although difficult to collect a large number of life-projects in the various occupations, industries and professions. If these projects were national in their scope, they would give a clue to the material actually used. There is serious difficulty in trying to organize a curriculum based entirely upon the material from this source. Great care would have to be taken in the completeness of the selection of the projects; the principles underlying would have to be defined; and again, a course of study based entirely on this might be subject to the criticism that we are training the students to meet situations which will be changed when they are ready to use this material.

If this method be used, it will be well to supplement with a systematic organization. The student will then have more cues to aid in solving a new problem and will not have his principles tied up in a few concrete examples.

Though there are many difficulties seen in attempting to use this method as the basis for curriculum organization and construction and few would recommend that it be used as the only method in determining minimal essentials of subject matter, yet there is no excuse for collecting this data as widely as possible and using it for what it is worth. No one can doubt that it will be valuable.

The relation of the project to the curriculum is well summarized by Charters: "If the project is to be made the basis of the curriculum, it is necessary for the teacher to decide as scientifically as possible what principles and processes should

be mastered by the student and then to select not single projects but groups of projects so arranged that election of projects is made possible with the certainty that all essential facts, processes, and principles will be covered. Then, when the principles and processes have been covered by the project method in class, enough time should be left in the course so that the subject matter may be systematized. First, the project is used for the approach to all parts of the subject, and then a systematizing study of the field follows as an extended summary."[1]

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1. Charters, W. W. The Project in Home Economics Teaching. The Journal of Home Economics, Vol. 10, p. 117, March, 1918.

## CHAPTER IV

## ILLUSTRATIVE PROJECTS

### The Legal and Medical Clinics.

It is now generally conceded that a training in legal reasoning and substantive law can be most economically learned in the law school. It is thought, at least by many, that practice can be more economically and satisfactorily learned in the office. This point is emphasized by E. M. Morgan: "It is doubtless true that familiarity with the principles of practice and their application could be most effectively acquired in some offices, if the lawyers in charge thereof were so minded. But only in those offices having a general practice could anything like a comprehensive knowledge of the subject be attained without a great deal of independent investigation. At present, the offices of general practice are few; and in those few offices the time of the experienced men is considered too valuable to be spent in the instruction of embryo jurists."[1] The office may theoretically offer the best opportunity to get a well-rounded training in practice, yet so few offices have a general practice that it seems best to look to other sources for the training in practice.

The instructors in the law schools are beginning to feel that some provision should be made to give this training in

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1. Morgan, E. M. The Legal Clinic. The American Law School Review, Vol. 4, p. 255, March 1917.

practice in connection with the work of the law school, as Morgan indicates: "There would seem to be no more reason for failing or refusing to teach the principles of practice than for dropping the usual courses on pleading and evidence. Why should a law school teach the requisites of pleadings, the effect of defects and irregularities therein, and the methods of attacking them, and refuse to give instruction as to the same matters with reference to process? Is it less essential that a student know the effect of an appearance than that he know the effect of pleading over? The principles underlying the right to a jury, the selection of jurors, and the right to open and close, to take or force a dismissal, and to secure a directed verdict; the rules governing instructions to the jury and requests therefor;....... the privileges and limitations of counsel in arguing to the jury; the prerequisites and grounds of motions for a new trial, judgment notwithstanding the verdict, or an appeal - all these and other matters of practice are fully as important as the rules of evidence. They are almost as adequately treated in the decisions, and are as readily and as satisfactorily taught by the case method. And, in fact, the rules of pleading and evidence are of little practical value unless properly articulated with the rules and principles of practice."[1]

It is possible to be familiar with the principles and rules of evidence and practice and not be able to recognize their applicability to a given case. This situation is similar to one in which the girl in household science may know the principles of

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1. Morgan, E. M. The Legal Clinic. The American Law School Review, Vol. 4, p. 255.

a balanced meal, the principles of interior decoration, and yet may be helpless in applying these rules to home conditions.

The real test of ability in practice is shown in the power to apply rules to concrete cases. In law likewise "the real criterion of one's knowledge of procedure is one's ability to apply its rules, as well as the principles of substantive law, not to cases where only the revelant and material facts are given, but to cases as they actually arise in everyday life and as they are presented in court."[1]

In attempting to provide a substitute for the real practice, the moot or practice court was proposed. This has many advantages, in that it gives a certain amount of technique in carrying a case through to completion. Evidence is taken, briefs are prepared and the pleadings made, yet the one serious drawback is that the situation is not real. There are no real witnesses, the whole thing lacks the human element. The student has no responsibility to protect the rights of the client, "the so-called witnesses are ready to his hand; they are usually able clearly and intelligently to tell their stories, and to distinguish the material from the immaterial."[2]

In order to overcome some of the deficiencies in obtaining practice in legal procedure, the University of Minnesota in 1913 began an experiment in coöperation with the Associated Charities of Minneapolis. "At its head was placed a young

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1. Morgan, E. M. The Legal Clinic. The American Law School Review, Vol. 4, p. 255.

2. Morgan, E. M. The Legal Clinic. The American Law School Review, Vol. 4, p. 256.

practicing attorney, who was later given as an assistant another young member of the bar. This attorney was appointed an instructor in practice in the University Law School."[1] Each student spends three weeks in this work. The student has to work out the cases, interview clients, take down testimony, investigate facts, negotiate for settlement, and draft the pleadings. His mistakes are pointed out and he is required to correct them. This experience gained is varied. About three hundred cases are handled a month. The cases are of comparatively insignificant, momentary consequence yet there are many times splendid points in law brought out. The course serves to round out the course in practice, it makes up the deficiency after the study of the principles of practice cases, drafting of the pleadings and it makes the work real -- there are real cases tried. He is trained to deal with different human natures.

The objection usually cited against the legal clinic is that too few cases are tried to make it worth while. Professor John H. Wigmore, Northwestern University Law School, answers, "The objection, by the way, that the range of cases in legal work is not sufficiently varied, has sometimes been raised by members of the bar, even in large cities. But a full acquaintance with the work of an active legal aid society would dispel the objection. The variety of cases is certainly far greater than in any single law office. Do you know that the largest law office in the United States is the Legal Aid Society of New York with nearly 40,000 new cases annually? Do you know that the

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1. Morgan, E. M. The Legal Clinic. The American Law School Review, Vol. 4, p. 256.

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next largest law office is the Legal Aid Society of Chicago with 12,000 cases annually? The litigation arising out of these cases ran into every court in the country, and involved the use of practically every variety of legal document. In more than one case, the society's attorneys helped to make law both in the supreme court and in the legislature's sessions."[1]

A brief survey of the methods that have been, and are now being, employed in the study of law will show that the use of the legal clinic is an outgrowth of an effort to make the law teaching not only more interesting but more thorough and more practical.

The first method employed was the learning of the principles of law, with some illustrations. This method is no longer used in the best law schools. It is recognized that such a method gives no more than a superficial knowledge of the law. The technique of the case, the points of contention, etc., are eliminated. The study of Blackstone as the only text illustrates this method. This method was followed by the case system. The merit of the case system as indicated by H. W. Ballantine "is mainly due to the fact that the cases present concrete problems in the application of legal principles to facts, and afford an opportunity for arguing how the rules of law should be formulated. But the student usually regards the cases, not as problems demanding solution, but as problems already solved by the judge, to be studied by him as authoritative statements of the law. His

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1. Wigmore, John H. The Legal Clinic, Case and Comment. Vol. 28, p. 974, May 1917.

task is that of understanding the judicial opinion."[1] In order to make the case system more vital Ballentine suggests the introduction of problems:

"Even if the professor puts problems in the course of classroom discussion, that subject having been covered, the student does not take the problem home with him for individual original thought. In reading the cases it does not occur to him ordinarily to compare the various cases that he reads. The average student does not seem to have any adequate conception of what he is supposed to do with the cases assigned. He does not know what he is looking for, or what to put his effort upon. The study hours are confined largely to assimilative reading, and the abstracting and absorption of the doctrines laid down in the opinions.

"Problems may then be advantageously employed for advance study as well as for review. Instead of simply giving out problems in class after the cases have been covered, why not assign one or two problems for each meeting of the course, involving a practical application of the text or cases to be studied? Let oral or written solution be prepared, using the casebook or textbook as the place for original research. In this way the student will seek for and grasp the principles of a case as something to be used, not merely to be studied and learned for its own sake. Under such stimulus the student should be able to read many more cases with much greater intensity of effort, concentration, and comprehension."[1]

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1. Ballentine, H. W. Teaching Contracts with the Aid of Problems. <u>The American Law School Review</u>, Vol. 4, p. 118, June 1916.

The legal clinic is but an additional effort to provide a more real and vital method for the teaching of the principles of procedure.

If the student in the legal clinic could actually do all the pleading and take complete charge of the case, it would constitute a project. To the extent that he carried the process toward completion, to that extent it is the project method.

The case method has been considered by some educators as the project method of teaching law, because as they point out, the method of finding the points of law as stated in the cases, is exactly ~~what~~ the one the lawyer ~~does~~ uses in practice. The case method does not meet the requirements of the project because it does not provide a natural setting for the problem. The case is usually solved and the mental activity which is required of the student is the memorizing of the case as presented.

The objections raised to the legal clinic are interesting because of the light ~~it~~ they ~~throws~~ throw on the extent to which the project method may be used in legal education.

(1) The legal clinic is inadequate to give a wide range of practical experience. Important cases in law will not be intrusted to the care of beginners.

(2) The training of the clinic is likely to be unsystematic, unless supplemented by a systematic review.

(3) The time taken up by the clinic work is not justifiable.

(4) Since the state only may set up a court, it will be impossible for students to carry the case to completion before they are admitted to the bar.

The points in favor of the clinic are:

(1) It gives some actual experience. It teaches the method of carrying a case through.

(2) The work in the clinic is done with a high degree of interest.

(3) It provides a natural situation.

The experience of the medical schools has shown that students may know the theory of diagnosis as represented in their ability to solve theoretical cases, and yet be helpless at first in a real situation. They may know the theory of operating, may have helped in a few cases, and yet may fail when the responsibility rests on them to carry out the whole operation. This is a parallel case to the law student who knows the theory of the case and of court procedure and yet may not be able to carry out a case when facing a real jury with a real client.

A number of physicians and surgeons of Chicago, some of them recognized as leaders, were asked to give the outstanding deficiencies of the graduates of the leading medical schools, as observed when these graduates began their interneships. These two were given by each of the fourteen physicians and surgeons consulted:

(1) The graduates have a large number of facts, but they are not evaluated. All facts seem to stand on the same dead level.

(2) No skill in surgery. Some reported that few had any idea of the simplest technique.

The medical schools in order to try to provide for this special technique have instituted the clinic. The material

for the medical clinic is abundant; the cases presented for treatment are real and are as difficult to diagnose and treat as the cases which the practitioner will meet. The difficulty is that all the students observe while the lecturer does the work. The students have no opportunity to take part in the work.

The leading schools are now recommending that the graduates complete an interneship before going into practice for it is claimed that the variety of cases which the interne takes care of during the period of interneship is likely to be greater than those met in the first ten years of practice. In fact, the great advantage which is claimed for the interneship is the large number and the variety of cases over which the young doctor must take complete charge.

After completing the interneship, the young doctor has confidence in himself, he has now not only solved hypothetical cases, but he has also actually received the patient, made the diagnosis, prescribed the remedy, watched the daily results, given directions to the nurse, made the patient realize the necessity of following directions, looked after the diet and at the same time studied the case, reviewing principles which had been previously learned.

The method of teaching practice to the doctor by the clinic or by serving the interneship illustrates in a measure the project method. The diagnosis of a theoretical case is not a project for it does not arise in a natural setting. The interne taking complete charge of a patient has exactly the same situation as faces the practitioner. The more the principles of diagnosis can be studied in connection with real cases, the more

the principles and technique of surgery can be learned in connection with real cases, the more nearly will it approximate the true project method.

If the clinic be used merely as a laboratory experiment to illustrate principles learned at some previous time, then it is not a project.

The project method applied in the medical schools would make the following suggestion necessary: Before the student began the study of surgery, diagnosis, etc., he would have a junior interneship, in which he would observe operations and diagnosis. Paralleling this interneship, he would study the processes involved in the operations and the diagnosis. In other words the problem in the cases presented would constitute the basis for the courses in surgery and medicine. Obviously, a large number of cases could not be observed or carried through but this could then be supplemented by a systematic study of cases not actually observed.

At the present, this would cause a rearrangement of the courses given in the medical schools. It would mean that some parts of the courses would be given in the hospital. This may not be easy to accomplish but the efficiency of the method cannot be questioned. As a substitute for this, it is proposed that the medical school require the students to spend a junior interneship in a hospital between the second and third years, and between the third and fourth years. This would be two three-months' periods. Opportunity to help in operations and diagnosis would be valuable and would raise problems which would make the following years of study vital and real.

In summarizing, it would seem that the most that can be claimed for the legal clinic is that it is a very desirable element in legal training but cannot be relied upon to give a systematic training which is necessary; unless more time is taken that can be justified by the results. As a method to be supplemented with other methods it is highly desirable because it teaches the method of carrying a case to completion and of evaluating material. It demands and usually obtains a high degree of interest.

The clinic has won its place in the medical profession. It is an indispensable element in the medical training. The interneship is now regarded as a very essential part of the course. If the clinic were made to include actual practice by the student and if the interneship were paralleled with a study of the principles underlying the case, they would be more effective. The clinic is usually an illustrative lesson or a demonstration and the interneship is usually conducted as a practicum or as a laboratory exercise. The principles are all studied first and completed, then the young doctor is placed in the hospital to try to apply all these principles at once. Unless exceptionally careful supervision is maintained, many serious mistakes will result. If after studying part of the principles, he could have a short interneship in order to use those principles and realize the need for more, it would be a great improvement. Better still, would be the method if the student were asked to aid in taking care of the case and then were sent to the medical book to determine the principles, remedy, etc. In this way the various cases would compel him to seek

out the principles. This would, of course, be supplemented by a systematic training.

Summer Surveying Courses

The practice work usually given in connection with the surveying courses has been (1) the surveying of the campus, (2) the summer camp work where a certain amount of territory is assigned, and (3) the actual practical work. Professor C. E. Sherman gives the account of the beginning of the Summer Surveying Courses at the Ohio State University.

In response to student sentiment, and in view of the fact that the campus exercises gave no noticeable proficiency in the use of instruments, nor an adequate idea of procedure in the field, a special course in field practice was tried in June, 1888.

"The class of seven second year civil engineers in charge of Professor Brown, after studying land and railroad surveying for a year, spent one week in June in making a reconnaissance, preliminary, and location survey for a proposed electric railway two and a half miles long, between two small towns distant about 60 miles from the University in the rough southeastern portion of Ohio. Most of field work was completed, map drawn up in pencil, and earthwork partly figured before leaving the field."[1]

There grew up a feeling among the students that some provision should be made to supplement their exercises on the campus and their theoretical work with summer work. In 1900 the University authorities provided a camp equipment and this practice training was continued in the camps from 1900 to 1902.

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1. Sherman, C. E. and Schlafly, R. K. Summer Surveying Courses at the Ohio State University. Engineering Education, Vol. 21, pp. 278-319

These camps gave excellent practice. It furnished an opportunity to show the difficulties that are met in surveying that would not be brought out on the level campus. The work was rotated, in order to give the boys the different types of training. Office work was done each night, plotting notes, inking maps and calculating earth work. This work was not a project, it was a multi-problem. The problems did not arise in their natural setting. The work was done to pass a school requirement and to give laboratory work.

The boys who were excused from these camps to go on practical work came back with such a fine spirit to their tasks in the fall that after these three sessions, it was decided to try out the practical summer camp system. "What we may term here the practical camp system means the practice of accepting suitable contracts for surveying, using for this purpose the students who do not get positions for themselves."[1] The practical work, which is allowed as a substitute for this practical camp work, must be selected so that it will give instrumental and office work. "The work in the practical summer camps have never been looked upon as 'snap courses' and the students who were due have earnestly tried to get work in lieu thereof."[1] The work of the practical summer camp is done under the supervision of one of the university instructors who acts in the capacity of a foreman. The experience of the class as a whole will vary widely in amount and character, but this may be looked upon as an advantage, for, "in the work before the class in the lecture room, it arouses the members when points are brought

1. Sherman, C. E. and Schlafly, R. K. Summer Surveying Courses at the Ohio State University. Engineering Education, Vol. 21, pp. 297-313.

forward from their collective experience." The aim of the department has not been to give identical training to each member of the camp. "The aim has been rather to accept a real task, the accomplishing of which will forcibly illustrate to the student, the use of the instruments and methods of his calling."[1] When the student sees instructors attempting real problems and relying on each fellow to do his share, it encourages a spirit difficult to get in imaginary or practice problems. The students are expected to give suggestions and to question the work at any stage.

The practical summer camp and the employment with concerns are both superior to the practice summer camp. The advantages for the practical summer camp work are:

(1) The student gets more thorough drill on a few principles even though not such a broad training.

(2) The sense of responsibility is increased.

(3) There is great interest attached to the job.

The opponents of the practical summer camp scheme claim that in the practical camp it is "difficult to adapt the work to meet exactly the educational needs of the students, the incessant and comprehensive drill in fundamental principles."

<u>The Coöperative System of Education</u>.

The development of the coöperative system of engineering was due to the fact that the old apprenticeship system had broken down under the strain of the varied commercial demands and that the colleges of engineering were making little effort

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1. Sherman, C. E. and Schlafly, R. K. Summer Surveying Courses at the Ohio State University. <u>Engineering Education</u>, Vol. 21, p. 313.

to connect theory and practice. The colleges that were attempting to give practice were maintaining their own shops and plants at a tremendous expense. It became apparent that to try to keep up with illustrative shops would be out of the question. To Professor Herman Schneider belongs the credit for planning a course which could use the established manufacturing plants for the practical training and thereby allowing the University of Cincinnati to devote its interest to the theoretical.

The course outlined by Professor Schneider in engineering is a five year course of eleven months yearly. The work is alternated so that the students spend two weeks out of four in the university and the other two weeks in the coöperative manufacturing plants. There are two shifts of students so that while one group is in the university the other is in the plants. The practical work is carried on continuously. The work of the course is outlined so that there is correlation between the work done in the plants and that done in the university. The practical projects undertaken, determines the subject matter to be taught in the period spent in the university.

There seems to be heightened interest in both the practical and theoretical work. The wages earned by the boys in the coöperative plants give an added incentive. The scheme has had a wholesome influence on the curriculum and also on the subject matter of the different subjects. Descriptive material that has no apparent place is eliminated and the additional time is spent in drilling on fundamentals.

"By 'Coöperative System' is meant the coördination of theoretical and practical training in a progressive educational program. Since the agency which furnishes the practical

experience is always some branch of actual industry, the reciprocal relation between school and shop permits the fullest possible utilization, for educational purposes, of equipment used in commercial production. Obviously, the arrangement of alternating periods is a mere administrative detail. From the employer's point of view, the most important elements of the coöperative plan are: First, the selection of workers; and, second, the awakening of an enlightened interest in their work through coördinated instruction."[1]

The feature of the coöperative education which is the most important from the school standpoint is the "realization of theory through its practical applications."

The practical work which is carried on in the coöperative factories set up for the students problems which demand solution. The course in the university is so graded that the tasks in practice are not beyond the student. The problem of doing a certain task demands that he apply his theory gained in the previous two weeks' period and apply it to this situation. The practical projects of the plant arise in their natural setting. They are carried to completion in their natural setting. When the student goes back to the theoretical he has many theoretical problems that he is anxious to have help in the solution.

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1. Park, Clyde William. The Coöperative System of Education. - An Account of Coöperative Education as Developed in the College of Engineering, University of Cincinnati, Bureau of Education, Bulletin 37, 1916.

# CHAPTER V

## SUMMARY OF CONCLUSIONS

It is the purpose of this brief chapter to bring together the conclusions which we have been able to draw in this investigation.

1. A survey of the literature dealing particularly with agricultural education, the teaching of home economics and of the trades and industries and the administration of the Smith-Hughes Act is sufficient to show that the term project has a wide use.

2. The term project as defined or characterized in the literature has lacked uniformity in meaning.

3. The determination was made of certain elements in a type of teaching situation which constitute a project. These elements or standards were treated as four pairs of contrasted aims or types of learning. The project emphasizes the first in each of the four pairs.

(1) Reasoning and the memory of information.

(2) Conduct and information for its own sake.

(3) Natural Setting for learning and Artificial Setting.

(4) The Priority of the problem or of principles.

4. An examination of concepts now in use and more or less closely related to the project, (topic, problem, example,

original, exercise, drills, test, review, illustration, demonstration, experiment and practicum), was made for the purpose of estimating their availability for describing the teaching situation indicated in 3. None of these concepts, in their accepted meaning, provides for such a teaching situation.

5. The project is a problematic act carried to completion in its natural setting.

6. The project creates interest of a deep-seated sort because the interest comes from associative connections of many sources. The project offers many more reservoirs from which interest may be drawn. All projects are not interesting to any one student, but if a project is selected so as to be of interest, the degree of the interest is likely to be very high because of the setting in the experience of the student.

7. Projects are not intrinsically interesting, in spite of the claims made by the advocates of the project method. Projects may be interesting or uninteresting. They may be interesting to one class and not to another, to some members of the class and not to all. It can, of course, be shown that the possibilities of interest are much greater than in the facts learned in topical organization.

8. The project gives the ideal organization of subject matter to arouse an aim and to direct thinking. The thinking that is of most worth to the individual is the thinking that is directed by his own aim and not an aim held by some one else or an aim that is forced upon him. If the pupil has a specific aim which he understands and knows the difficulty which he has to solve, there is little doubt but that he will be able to select his material

intelligently to aid in the solution. "An advantage claimed is that the natural setting and the great multi-problem of the project, with its coherent subordinate problems make the intellect function in a fuller tide of activity. The strong initial motive and the constant side lights from practical conditions and immediate practical outcomes make the student think with a higher degree of effectiveness."

9. The importance of habit-formation is too important to take it for granted that in using the project method they will be formed incidentally. A methodology which makes no provision for these other than in a purely incidental way is seriously defective and may greatly make its theory subject to the criticism that it is encouraging "soft pedagogy." The weakness of the project in making provision for drills and exercises in habit-formation is genuine. The attempt to minimize the importance of skills and habits does not answer the problem. The project method, to be accepted widely must make provision for skills and habits.

10. The project method takes care of the technique of carrying out a complete act. If the boy has been taught agriculture by the project method, he knows how to do things. He does not know merely the theoretical phases of growing potatoes, he has learned the method of performance. The project provides for the technique of the completion of the act after the theoretical problem has been solved. "The acquisition of skill in carrying out processes in actual practice is an advantage" claimed for the project.

11. Ideals are developed by the satisfaction coming from doing a thing well. The project should develop not only the

technique of doing a certain task well but should develop the ideal to continue improvement. The project gives students confidence in carrying through a problem, satisfaction results, conditions are made better, they are happier and the next step is the development of Ideals.

12. The relation of the project to the curriculum is well summarized by Charters: "If the project is to be made the basis of the curriculum it is necessary for the teacher to decide as scientifically as possible what principles and processes should be mastered by the student and then to select not single projects but groups of projects so arranged that election of projects is made possible with the certainty that all essential facts, processes, and principles will be covered. Then when the principles and processes have been covered by the project method in class, enough time should be left in the course so that the subject matter may be systematized. First, the project is used for the approach to all parts of the subject, and then a systematizing study of the field follows as an extended summary."

13. The idea contained in the term project is used under different names in the field of law, medicine, engineering and coöperative education.

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